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*Instrumentation  
for the Theory of  
Work Adjustment*

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# MINNESOTA STUDIES IN VOCATIONAL REHABILITATION

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*Instrumentation for the Theory  
of Work Adjustment*

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All computations reported in this monograph were carried out on the Control Data Corporation 1604 Scientific Computer, at the Numerical Analysis Center, University of Minnesota.

# The Minnesota Studies in Vocational Rehabilitation

The Minnesota Studies in Vocational Rehabilitation, better known as the Work Adjustment Project, are a continuing series of research studies being conducted on the general problem of adjustment to work. Specifically, they focus on the work adjustment problems relevant to vocational rehabilitation services. These studies, begun in 1957, have two objectives: the development of diagnostic tools for assessing the work adjustment "potential" of applicants for vocational rehabilitation, and the evaluation of work adjustment outcomes. These primary goals are embodied in a conceptual framework for research, entitled the *Theory of Work Adjustment*. This theory uses the correspondence (or lack of it) between the work personality and the work environment as the principal reason or explanation for observed work adjustment outcomes (satisfactoriness, satisfaction, and tenure). The theory states further that vocational abilities and vocational needs are the significant aspects of the work personality, while ability requirements and reinforcer systems are the significant aspects of the work environment.

Work Adjustment Project research has been directed at testing the validity and usefulness of the *Theory of Work Adjustment*. For example, it has been shown that vocational needs are measurable and can be measured separately from measured job satisfaction. In addition, it has been demonstrated that job satisfaction in a variety of work environments can be predicted from the correspondence of measured vocational needs and either estimated or inferred job reinforcer systems. It has also been demonstrated that job satisfaction and job satisfactoriness are measurable indicators of work adjustment, and that they can be measured independently of each other.

The Work Adjustment Project is oriented toward further improvement of measures of vocational needs and vocational abilities, with the aim of providing vocational rehabilitation counselors with adequate tools needed for evaluating the work personalities of vocational rehabilitation applicants. Efforts are also being directed at developing efficient but economical methods of determining ability requirements and reinforcer systems for work environments. In addition, work continues on testing, developing, and modifying the *Theory of Work Adjustment* and its implications for a psychology of disability which treats disability in work adjustment, rather than in medical diagnostic, terms.

The present monograph reports the development and refinement of measures of vocational needs, vocational abilities, satisfaction and satisfactoriness, for use in connection with the *Theory of Work Adjustment*. The study was based on

data obtained on 2,042 men in six occupational groups representing a wide range of occupational levels and fields.

## Implications for Vocational Rehabilitation Practice

Because of its relevance to the stated goals of vocational rehabilitation, the *Theory of Work Adjustment* provides the vocational rehabilitation counselor with a useful systematic framework for vocational counseling practice. Application of the theory calls for the independent measurement of the vocational abilities and the vocational needs of each applicant for vocational rehabilitation. Vocational abilities can be measured by the General Aptitude Test Battery and vocational needs by the Minnesota Importance Questionnaire. These two instruments were found to be relatively independent of each other for most occupational groups, that is, they measured different sets of vocationally relevant characteristics.

Application of the theory also requires the measurement of work adjustment indicators: satisfaction and satisfactoriness. The measures of satisfaction and satisfactoriness developed in the Work Adjustment Project have been found to be reliable, to be easy to administer, and to meet the requirements of the *Theory of Work Adjustment* in that they measure different aspects of work adjustment. Since these instruments (satisfaction and satisfactoriness) yield indications of work adjustment, they can be used to evaluate vocational rehabilitation outcomes. Thus, follow-up studies of individuals can be conducted using measures of satisfaction and satisfactoriness to evaluate the results of rehabilitation. That is, a quality dimension can be utilized in addition to the usual quantity (number of closures) criterion of vocational rehabilitation effectiveness. Furthermore, the types of services given in rehabilitation, for example, kind, duration, and intensity of vocational counseling, can be studied in terms of the resulting satisfaction and satisfactoriness of the rehabilitants.

The findings reported in this present monograph support the *Theory of Work Adjustment* concept of matching men and jobs, and show that this concept can be realized in practice.

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# Instrumentation for the Theory of Work Adjustment

## Summary

This monograph reports the development and refinement of a set of measuring instruments for the major variables specified in the *Theory of Work Adjustment*. These variables include vocational needs and vocational abilities as the predictor variables, and satisfaction and satisfactoriness as the criterion measures of work adjustment. Data were obtained on 2,042 men in six occupational groups representing six levels of the occupational hierarchy.

A pair comparisons form of the Minnesota Importance Questionnaire (MIQ) was developed as the measure of vocational needs. The pair comparisons format was used in an attempt to overcome some psychometric deficiencies stemming from the Likert format of the original MIQ. Results with the pair comparisons form showed that the scale intercorrelations were lower, the factor structure was more complex (consisting of three factors, two of which were bipolar), scale means were closer to the midpoint of potential range, and scale variances were generally larger, in comparison with the Likert form of the MIQ. The pair comparisons form also differentiated among occupational groups in meaningful ways, and in addition yielded an inconsistency score which could be used to detect random responding. These results suggest that the pair comparisons form represents an improvement over the Likert form of the MIQ.

The eight paper and pencil tests of the General Aptitude Test Battery (GATB) and a Tool Knowledge Test were used as the measures of vocational abilities. Results with these tests indicated that they were very reliable (internally consistent) measures, but were highly intercorrelated with each other. Factor analysis of the ability test correlation matrix yielded a single general speed factor. While the tests differentiated among occupational groups, the differences tended to be less meaningful than those observed for the vocational needs measure.

The relationships between the two sets of predictor variables (needs and abilities) were studied for the total group and for each of the occupational groups separately. The results showed that

cross-correlations between needs and abilities were generally low, while canonical correlations between the set of needs and the set of abilities were of moderate size for the total group and for four of the occupational groups. For one of the occupational groups, a high canonical correlation between the need set and the ability set was obtained, indicating the possibility of occupational differences for the need-ability relationship. The finding that relationships between the two sets of variables were generally lower than the relationships within either set, confirms an expectation deduced from the *Theory of Work Adjustment*.

The measure of satisfaction was a short form of the Minnesota Satisfaction Questionnaire (MSQ). It consisted of the 20 most representative items of the long form, one for each MSQ scale. The short form MSQ took only five minutes or less to complete. The factor structure consisted of two factors—intrinsic and extrinsic satisfaction. When factor scores were derived from the questionnaire, they were found to have high reliabilities. However, the factor scores were relatively highly correlated. The short-form MSQ showed differences among occupational groups, confirming an expectation from previous job satisfaction research. Most results with the use of the short form were similar to those obtained with the long form MSQ.

The satisfactoriness measure developed for this study was also based on a previous Work Adjustment Project satisfactoriness instrument. The new measure consisted of items from the previous measure (with the exception of alternation ranking) and several new items written to expand the aspects of satisfactoriness covered in the older instrument. The initial pool of 59 items was administered experimentally to a large group of supervisors. Analysis of the completed questionnaires enabled the reduction of the instrument to 29 items, and a corresponding reduction in questionnaire-completion time to five minutes or less.

The 29-item satisfactoriness questionnaire was completed by the supervisors of the individuals in the study. Factor analysis of the item correlation matrix yielded three factors: promotability-competence, conformance, and personal adjustment. The 29 items were also scored as a "general satisfactoriness" scale. Reliabilities for these four scales (three factors and general satisfactoriness) were high, although scale intercorrelations were also relatively high. Mean and variance difference analysis indicated that separate occupational norms were necessary for at least three of the four scales.

Analysis of the relationships between the criterion variables (satisfaction and satisfactoriness) supported the *Theory of Work Adjustment* and confirmed previous Work Adjustment Project findings. This analysis showed that little or no relationship was found in the cross-correlation of measured satisfaction and measured satisfactoriness. Furthermore, canonical correlations between the two sets of variables were also insignificant, accounting for a maximum of only 2% common variance. Finally, these relationships between satisfaction and satisfactoriness were found to be uniformly low for the separate occupational groups.

# Introduction

The Work Adjustment Project has, as one of its immediate goals, the development of instruments measuring the variables specified in the *Theory of Work Adjustment*.<sup>1</sup> Among these variables are satisfactoriness and satisfaction, vocational abilities and vocational needs, ability requirements and reinforcer systems.

The *Theory of Work Adjustment* defines work adjustment primarily in terms of satisfactoriness and satisfaction. Thus, the concurrent levels of an individual's satisfactoriness and satisfaction measure his work adjustment in a particular work environment at a given point in time. Satisfactoriness and satisfaction, then, are the *criteria* of work adjustment.

According to the theory, satisfactoriness is a function of the correspondence between the individual's abilities and the ability requirements of the job, while satisfaction is a function of the correspondence between an individual's needs and the reinforcer system in the job. In a given environment, where ability requirements and reinforcer system are presumably invariant, satisfactoriness becomes a function of abilities, and satisfaction a function of needs. Thus, abilities and needs are *predictors* of satisfactoriness and satisfaction respectively, and therefore of work adjustment.

Research in vocational psychology has shown that ability requirements can be inferred from data on the abilities and the satisfactoriness of employees on the job.<sup>2</sup> Recent Work Adjustment Project research has also shown that reinforcer systems can be inferred from data on the needs and the satisfaction of employees.<sup>3</sup> Thus, progress in the prediction of work adjustment criteria depends primarily on the adequacy of instruments available for the measurement of abilities and needs, and of satisfactoriness and satisfaction.

This monograph reports on the development and application of instruments to measure one set of the predictors of work adjustment—vocational abilities and vocational needs—and the criterion variables which are indicative of work adjustment—satisfactoriness

<sup>1</sup> Dawis, R. V., England, G. W., Lofquist, L. H. A theory of work adjustment. *Minnesota studies in vocational rehabilitation*, XV, 1964.

<sup>2</sup> e.g., the Occupational Aptitude Patterns developed on the basis of the General Aptitude Test Battery. Sec. U.S. Dept. of Labor, *Guide to the Use of the General Aptitude Test Battery, Section II: Norms—Occupational Aptitude Pattern Structure*, 1962.

<sup>3</sup> Weiss, D. J., Dawis, R. V., England, G. W., Lofquist, L. H. An inferential approach to occupational reinforcement. *Minnesota studies in vocational rehabilitation*, XIX, 1965.

and satisfaction. Subsequent monographs will report on various approaches to the determination of ability requirements (or occupational ability patterns) and reinforcer systems (or occupational reinforcer patterns) and the prediction of work adjustment outcomes.

Previous Work Adjustment Project research has been concerned with the measurement of satisfactoriness,<sup>4</sup> satisfaction,<sup>5</sup> and vocational needs.<sup>6</sup> However, in none of these studies has there been a group for which data were available on the predictors (abilities and needs) and the criteria (satisfactoriness and satisfaction) at the same time. Such data, if the group were of one occupation, would enable the simultaneous inference of occupational ability patterns (OAPs) and occupational reinforcer patterns (ORPs), and the investigation of relationships among the predictor variables, among the criterion variables, and between predictor and criterion variables, in the *Theory of Work Adjustment*.

In addition, it was felt that instruments previously developed in Work Adjustment Project research to measure satisfaction, satisfactoriness and needs, required certain improvements to overcome some technical problems which limited their efficiency and accuracy of measurement. The revision of these instruments (as a secondary research objective) was therefore integrated into the collection of data on both predictors and criteria for several occupational groups (as the primary research concern).

## Data Collection

To achieve the objectives outlined above, it was necessary to limit the collection of data to fairly well-defined occupational groups. In addition, to determine occupational differences in work adjustment, it was desirable to include occupations at various levels, and to represent both blue- and white-collar workers. Thus, data were collected on a relatively large number of individuals (target  $N = 400$ ) in the following selected occupational groups: (1) engi-

<sup>4</sup> Carlson, R. E., Dawis, R. V., England, G. W., Lofquist, L. H. The measurement of employment satisfactoriness. *Minnesota studies in vocational rehabilitation*, XIV, 1963.

<sup>5</sup> Carlson, R. E., Dawis, R. V., England, G. W., Lofquist, L. H. The measurement of employment satisfaction. *Minnesota studies in vocational rehabilitation*, XIII, 1962; Weiss, D. J., Dawis, R. V., England, G. W., Lofquist, L. H. Construct validation studies of the Minnesota Importance Questionnaire. *Minnesota studies in vocational rehabilitation*, XVIII, 1964.

<sup>6</sup> Weiss, D. J., Dawis, R. V., England, G. W., Lofquist, L. H. The measurement of vocational needs. *Minnesota studies in vocational rehabilitation*, XVI, 1964; *Minnesota studies in vocational rehabilitation*, XVIII, op. cit.; *Minnesota studies in vocational rehabilitation*, XIX, op. cit.

neers, to represent the professional level; (2) salesmen, as representatives of non-professional white-collar occupations; (3) clerical workers, as a different type of white-collar worker; (4) machinists, to represent blue-collar skilled occupations; (5) assemblers, in the blue-collar semi-skilled occupations; and (6) janitors and maintenance men to represent the blue-collar unskilled group.

These groups were developed by choosing individuals from the Minneapolis and St. Paul city directories who were listed as being employed in one of the six occupational groups. Each individual was telephoned by a member of the Work Adjustment Project staff to verify his job title (in the case of engineers, to determine also whether he was a graduate professional engineer) and to obtain telephone number and address. When lists of names with verified occupation and address information were developed, letters were sent to the listed individuals soliciting their cooperation and describing the Work Adjustment Project and its goals.

Within one week, each listed individual was contacted by telephone to arrange for an interview by a member of the Work Adjustment Project staff. A total of 4,191 individuals were contacted, of which 3,074 (or approximately 75%) agreed to be interviewed, while the remaining 25% refused to participate. A total of 2,858 interviews were completed.

At the completion of an interview, each respondent was asked to participate further in the study by taking a test battery at the University. Those who participated in the testing program were given written interpretations of their test results. Of the 2,858 persons interviewed, 757 (or about 37%) refused to participate in the testing program. Of the remaining 2,101 individuals, complete sets of test data were obtained on 1,460, or approximately two-thirds of the group volunteering to take the tests. The full test battery included measures of abilities, needs, and satisfaction.

Satisfactoriness data were obtained from the supervisors of the test volunteer group. Satisfactoriness questionnaires were mailed to supervisors of 1,923 individuals (the remaining 178 individuals were either self-employed, not in one of the original job groups, or were eliminated for other reasons). Three followups (post card, letter, post card) were used to increase proportion of returns. Of the total mailed, 23 outright refusals were received and an additional 148 questionnaires were either not returned or incompletely filled out. Thus, 1,752 completed satisfactoriness questionnaires were returned, representing 91% usable return from the total mailed. In most in-

stances satisfactoriness data were obtained within a few weeks of the psychometric data.

### Characteristics of the Total Group

For purposes of defining the total group, an individual was included if he had usable data available on *any* one of the four instruments, i.e., measures of abilities, needs, satisfactoriness, or satisfaction. Data on any one of these instruments were available on 2,042 men. (Women were not included to prevent confounding the analysis by introducing sex differences.) Descriptive characteristics of the total group are shown in Table 1.

**Table 1. Descriptive characteristics of total group  
(N = 2042)**

Characteristic	N	%
<b>Age</b>		
18 to 25	90	4
26 to 35	468	23
36 to 45	535	26
46 to 55	532	26
56 to 65	382	19
66 and over	35	2
<b>Education</b>		
no college degree	1498	73
undergraduate degree	464	23
graduate work or degree	44	2
<b>Present job</b>		
assemblers	122	6
clerks		
accounting clerks	71	4
bookkeepers	20	1
business machine operators	19	1
general office clerks	229	11
engineers	474	23
janitors	128	6
machinists	370	18
maintenance men	262	13
salesmen	284	14
<b>Tenure on present job</b>		
1 year or less	195	10
2 to 5 years	653	32
6 to 10 years	443	22
11 to 15 years	322	16
16 to 20 years	180	9
21 to 25 years	125	6
26 to 30 years	58	3
31 years and over	66	3

Table 1—Continued

Characteristic	N	%
<b>Number of previous jobs</b>		
none	678	33
one	447	22
two	338	17
three	228	11
four	139	7
five or more	212	10
<b>Years of full-time work experience</b>		
2 or less	29	1
3 to 5	150	7
6 to 10	242	12
11 to 15	237	12
16 to 20	300	15
21 to 25	207	10
26 to 30	280	10
31 and over	596	29
<b>Disabling conditions</b>		
none	1740	85
single disabling condition	302	15
multiple disabling conditions	42	2
disabling conditions		
orthopedic	141 <sup>a</sup>	7
cardiovascular	55	3
generalized and systemic	33	2
neurological	16	1
visual	17	1
respiratory	13	1
neuropsychiatric	15	1
hearing	6	.3
mental retardation	0	0
skin and allergy, genitourinary, speech and miscellaneous	52	2

Note—When percentages do not total 100, the remainder represents missing or unclassifiable data.

<sup>a</sup> Because of multiple disabilities an individual may be represented more than once.

Median age for the group was about 45 years, with 50% of the group between about 32 and 52 years of age. Seventy-three per cent of the group reported no college degree, and only about 2% reported having done some graduate study. The majority of the college graduates were engineers, since ordinarily a college degree is necessary for inclusion in that group.

The largest occupational group was engineers with 474 individuals, while only 122 assemblers made up the smallest group. All clerical workers combined totaled 339 individuals. Data on reported job tenure indicate that the group had relatively long tenure, on the average. Median tenure was 7.5 years, and 50% of the group had



been on the job between 4 years and 15 years. Only 10% of the total group had been on their present job for a year or less.

Thirty-three per cent of the total group reported no jobs other than their present job, in their work history. About 22% of the total group reported holding only one other job in their employment experience. When questioned about their years of full-time work experience, only 1% of the total group indicated that they had been working 2 years or less. Median number of years of work experience was 23, with an interquartile range of from 13 to 33 years. Twenty-nine per cent of the total group reported full-time work experience of more than 30 years.

Interviewees were also asked several questions to determine whether they had any disabling condition (disability status will be considered in later studies as a variable affecting work adjustment).<sup>7</sup> Fifteen per cent of the total group reported having some type of disabling condition. Two per cent of the total group reported multiple disabling conditions. The distribution of reported disabling conditions is shown in Table 1. The most frequently occurring disabling condition, reported by 7% of the total group, was orthopedic, with 141 reported instances. This was followed in order by cardiovascular (3%) and generalized and systemic (2%) conditions. The remaining disabling conditions listed were reported by 1% or less of the total group.

In general, the total group appears to be fairly well distributed over the age range for employed individuals, has had a relatively long occupational experience, which has been characterized by few jobs, is fairly well distributed among the various selected job categories, and reports an average number of disabling conditions for an employed group.

## Objectives

The objectives served by this data collection were: (1) to refine and revise the instruments necessary to measure the major variables in the *Theory of Work Adjustment*; (2) to provide a set of data with which to develop OAPs and ORPs for specific occupations; (3) to provide data with which to test some of the propositions of the *Theory of Work Adjustment*; (4) to provide data with

<sup>7</sup> See, for the disability identification questions used in the interview, Weiss, D. J., Dawis, R. V., England, G. W., Lofquist, L. H. Validity of work histories obtained by interview. *Minnesota studies in vocational rehabilitation*, XII, 1961, pp. 30-32 (questions 23-25).

which to determine methods for the optimal prediction of satisfaction and satisfactoriness; and (5) to provide data with which to study the relationship between disabling conditions and work adjustment variables.

This monograph reports on the first of these objectives. Subsequent studies will use these data to investigate the remaining questions.

## Predictor Variables

The *Theory of Work Adjustment* specifies two sets of variables as important in the description of the work personality, and therefore in the prediction of work adjustment. These two sets of variables are the individual's "vocational abilities" and his "vocational needs."

Vocational abilities are "dimensions of response measurable through the application of psychological testing procedures, principally by ability and aptitude tests."<sup>8</sup> These include the familiar verbal, numerical, spatial and perceptual abilities, in addition to the many other types measured by multi-factor and other ability tests.

According to the theory, vocational needs are "dimensions of reinforcement experience associated with classes of stimulus conditions which operate differentially as effective reinforcers."<sup>9</sup> In operational terms, vocational needs may be defined as the individual's preference for different types of reinforcers in the environment, i.e., preference for those stimulus conditions in the environment which he perceives as important to the maintenance of his behavior in the work environment.

This section will summarize Work Adjustment Project research on the measurement of the predictor variables (vocational abilities and vocational needs) and examine the relationships between them. Since more research was devoted to the measurement of vocational needs, this will be discussed first.

### Vocational Needs

Previous studies on instruments to measure vocational needs led to the development of the Minnesota Importance Questionnaire (MIQ).<sup>10</sup> This instrument measured vocational needs on twenty scales, in terms of an ideal job, using a Likert rating format ranging from "very important" to "very unimportant." Studies on the MIQ indicated that it had high internal consistency reliabilities and adequate test-retest reliabilities, and it differentiated meaningfully among occupational groups.<sup>11</sup> Studies of construct validity for the

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<sup>8</sup> *Minnesota studies in vocational rehabilitation*, XV, op. cit., p. 9.

<sup>9</sup> *Idem*.

<sup>10</sup> *Minnesota studies in vocational rehabilitation*, XVI, XVIII, XIX, op. cit.

<sup>11</sup> *Minnesota studies in vocational rehabilitation*, XVI, op. cit.

MIQ, using predictions derived from the *Theory of Work Adjustment*,<sup>12</sup> indicated that ten of the sixteen scales studied appeared to have some construct validity. It was further found that scores on the MIQ were differentially related to job satisfaction, and that unique and reliable "occupational reinforcer patterns" (ORPs) could be obtained from the multivariate regression of MIQ scores on general job satisfaction scores.<sup>13</sup>

While the MIQ showed promise, several technical problems resulted from the use of a Likert format. A major problem was that of rating bias. Responses to the five choices in the rating scale tended to cluster in the "important" and "very important" categories, with few responses of "neither important nor unimportant," "unimportant" or "very unimportant." This type of rating bias had two undesirable results: scale scores were highly skewed in a negative direction, and intercorrelations among the scales were generally higher than they would have been if the rating bias were minimized or eliminated. Factor analysis of these spuriously high intercorrelations led to the finding of a "general" factor which probably reflected in part this rating bias.

A second problem limiting the usefulness of the MIQ was lack of a measure of response consistency. Response inconsistency can arise from two sources: (1) individuals completing the questionnaire may not be properly motivated and are not responding to the content of the items, or (2) they may not be capable of understanding the items in the questionnaire, or the instructions, or both. Such response can be either random, patterned (e.g., alternating every other item or in some other systematic fashion) or inflexible (e.g., the individual responds in one category throughout the questionnaire). While the reading level of the MIQ was set at about the sixth grade level in an attempt to reduce the probability of lack of comprehension as a source of error,<sup>14</sup> no provision was made to detect inconsistent response resulting from motivational causes. Thus, seemingly valid scores may be obtained on the MIQ by those who, intentionally or unintentionally, are not responding to the item content.

In an attempt to overcome these problems, the MIQ was revised

<sup>12</sup> *Minnesota studies in vocational rehabilitation*, XVIII, op. cit.

<sup>13</sup> *Minnesota studies in vocational rehabilitation*, XIX, op. cit.

<sup>14</sup> Reading level was based on a "Flesch count." See *Minnesota studies in vocational rehabilitation*, XVI, op. cit., p. 20.

into a pair-comparisons format.<sup>15</sup> The pair comparisons revision of the MIQ was constructed as follows:

First, the 100 items of the Likert MIQ were correlated with their corresponding scale scores. The item which correlated most highly with total scale score for each scale was chosen as the item to represent that scale. By this process, 20 representative statements were selected—one for each of the 20 MIQ scales. Following is a list of scale titles and the statements chosen to represent each scale:

1. *Ability utilization*: I could do something that makes use of my abilities.
2. *Achievement*: The job could give me a feeling of accomplishment.
3. *Activity*: I could be busy all the time.
4. *Advancement*: The job would provide an opportunity for advancement.
5. *Authority*: I could tell people what to do.
6. *Company policies and practices*: The company would administer its policies fairly.
7. *Compensation*: My pay would compare well with that of other workers.
8. *Co-workers*: My co-workers would be easy to make friends with.
9. *Creativity*: I could try out some of my own ideas.
10. *Independence*: I could work alone on the job.
11. *Moral values*: I could do the work without feeling that it is morally wrong.
12. *Recognition*: I could get recognition for the work I do.
13. *Responsibility*: I could make decisions on my own.
14. *Security*: The job would provide for steady employment.
15. *Social service*: I could do things for other people.
16. *Social status*: I could be "somebody" in the community.
17. *Supervision-human relations*: My boss would back up his men (with top management).

<sup>15</sup> The use of the term "pair-comparisons" (vs. "paired-comparisons") follows the rationale of Guilford, J. P. *Psychometric methods*. New York: McGraw-Hill, 1954, Ch. 7.

18. *Supervision-technical*: My boss would train his men well.
19. *Variety*: I could do something different every day.
20. *Working conditions*: The job would have good working conditions.

Each of the 20 statements was paired with every other statement, yielding 190 pairs. These 190 pairs constituted the first 190 items of the pair comparisons MIQ. For the last 190 items of the 380-item questionnaire, the statement order of each pair was reversed. Thus, the first 190 items and the last 190 items of the pair-comparisons MIQ consisted of all possible pairings of the 20 statements. If the first half pairs are considered as being presented in A-B order, the second half consists of the same pairs presented in B-A order.

The scoring of the pair comparisons form makes use of an  $M \times M$  matrix of item responses for each individual, where  $M$  is the number of scales to be scored, or the number of statements to be paired (20, in the case of the MIQ). A hypothetical response matrix for an individual on a five scale pair comparisons instrument, following the procedure used in the MIQ, is shown in Figure 1.

In Figure 1, each cell of the matrix represents an item in the pair comparison questionnaire. In each cell of the matrix, a 1 is entered

**Figure 1. Hypothetical individual response matrix for five scale pair comparison instrument**

		Scale					Row Total
		1	2	3	4	5	
Scale	1		1	1	2	1	3
	2	2		2	1	2	1
	3	2	1		1	2	2
	4	1	2	2		1	2
	5	1	1	1	2		3
Column Total		2	1	2	2	2	

Note.—Item pair responses are recorded as 1 if the individual chose the first statement in the pair, and 2 if he chose the second.

if the individual chose the first statement in the pair; and a 2 if he chose the second statement. Scoring of the pair comparisons matrix (as in Figure 1 and in the MIQ) can be based on either rows or columns of the matrix, provided that the pairs are uniformly formed, e.g., by putting the row statement always before the column statement for every pair. Column scores can then be determined by counting the number of times an individual chose the second statement in the pair. This procedure implicitly weights as zero the choice of the first statement in the pair. Scoring by rows uses the opposite procedure—the number of first statement choices is counted, and second statement choices are ignored. For either row or column scoring on the pair comparisons MIQ, scale scores can vary from 0 to 19. The scale score indicates the number of times a statement representing a scale is chosen over other statements representing all other scales.

Since the upper triangle of the matrix includes the same statement pairs (items) as the lower triangle, except that the lower triangle presents the statements in each pair in reverse order, an index of inconsistency of response can be obtained by comparing responses in the upper triangle with those in the lower triangle. If the individual did not make the same choice in both halves of the questionnaire, his response would be considered inconsistent. In Figure 1, the inconsistency scale can be scored by comparing responses in cell 1, 2 (row 1, column 2) and cell 2, 1; cell 1, 3 and cell 3, 1; and so on. In the example in Figure 1, the only inconsistent response occurs for cells 1, 5 and 5, 1, since the individual chose the first statement in both cases. The total number of inconsistent pairs for this example, therefore, is 1.

In developing the pair comparisons MIQ, development group data were scored for both row and column scale scores, in addition to the inconsistency score. Internal consistency reliability coefficients were computed for both methods of scoring. Row and column score reliabilities were found to be equivalent. Scores derived by the two methods for the same scale dimension were correlated, resulting in correlations ranging from .66 to .93 with a median of .79. Eighteen of the twenty correlations were .76 or higher. Row-column scale score correlations closely paralleled scale reliabilities for the development group. Because of this relatively high degree of relationship, all subsequent analyses were carried out on column scale scores only, a coin-flip determining the choice. All analyses reported below are for column scale scores on the pair-comparisons MIQ.

The development data for the MIQ analyses consisted of 1,430 completed questionnaires.<sup>16</sup> Table 2 shows the sample sizes for the five occupational groups on whom these data were obtained. The smallest group was salesmen, with an N of 202; the largest group was engineers, with an N of 384. Fifty-four individuals in the total group indicated at the interview that they were in occupations other than the six major occupational categories being studied. Data from this miscellaneous group were included in all analyses of total group data, but were not included in the occupational comparisons.

Table 2. Sample sizes for MIQ analyses

Group	N
Janitors and maintenancemen .....	240
Assemblers and machinists .....	324
Office clerks (includes general office clerks, accounting clerks, bookkeepers and business machine operators) .....	226
Salesmen (retail and wholesale) .....	202
Engineers (graduate professional engineers) .....	384
Miscellaneous .....	54
Total .....	1430

### Scale Reliability

Internal consistency reliability coefficients were computed for each scale, using a formula developed by Hoyt,<sup>17</sup> for the total group and for each of the five occupational groups separately. These coefficients represent the proportion of inter-individual variability not attributable to individual-item interaction, that is, the proportion of total group variance that is reliable. Internal consistency reliability coefficients are shown in Table 3.

For the total group of 1,430 men, reliability coefficients ranged from .94 for the Moral Values scale to .73 for Achievement. Median reliability for the total group was .82 with 18 of the 20 coefficients being .76 or greater. For the development group on the Likert form of the MIQ, median reliability coefficient was .87, with a range of .77 to .91.<sup>18</sup> While it appears from these data that Likert MIQ re-

<sup>16</sup> A questionnaire was considered complete if responses were obtained on 95% or more of the 380 items. In the development data, no questionnaires were eliminated because of high inconsistency scores.

<sup>17</sup> Hoyt, C. J. Test reliability estimated by analysis of variance. *Psychometrika*, 1941, 3, 153-160; see also *Minnesota studies in vocational rehabilitation*, XIV, Technical Appendix, pp. 47-51, op. cit.

<sup>18</sup> *Minnesota studies in vocational rehabilitation*, XVI, pp. 26-27, op. cit.



**Table 3. MIQ internal consistency reliability coefficients<sup>a</sup> for total group and five occupational groups**

Scale	Total Group <sup>b</sup>	Occupational Group				
		Janitors and Maintenance	Assemblers and Machinists	Office Clerks	Salesmen	Engineers
1. Ability utilization	.75	.79	.76	.74	.72	.69
2. Achievement	.73	.75	.74	.68	.66	.68
3. Activity	.83	.82	.83	.83	.81	.82
4. Advancement	.81	.81	.84	.79	.77	.76
5. Authority	.83	.81	.84	.80	.82	.84
6. Company policies and practices	.79	.78	.80	.79	.74	.81
7. Compensation	.83	.81	.83	.81	.84	.84
8. Co-workers	.76	.72	.76	.76	.75	.78
9. Creativity	.76	.78	.73	.75	.74	.72
10. Independence	.85	.86	.79	.84	.86	.83
11. Moral values	.94	.91	.91	.94	.93	.96
12. Recognition	.79	.79	.81	.81	.77	.77
13. Responsibility	.77	.73	.76	.78	.76	.74
14. Security	.89	.85	.87	.88	.89	.88
15. Social service	.86	.81	.86	.85	.88	.88
16. Social status	.87	.85	.87	.87	.90	.88
17. Supervision—human relations	.81	.82	.81	.80	.82	.80
18. Supervision—technical	.82	.80	.82	.83	.81	.85
19. Variety	.83	.80	.84	.83	.81	.84
20. Working conditions	.81	.76	.78	.80	.76	.79

<sup>a</sup> Indicated by Hoyt analysis-of-variance reliability coefficient.<sup>b</sup> Includes 54 individuals whose jobs were not classifiable into the five occupational groups

liabilities are slightly higher, an unpublished Work Adjustment Project study, in which both Likert and pair-comparisons MIQs were administered to the same groups, found no significant differences in reliability coefficients for the two instruments.<sup>19</sup>

Reliability coefficients for the occupational groups varied slightly from that of the total group. For most groups, Moral Values was the most reliable scale, and Achievement had the lowest reliability. Coefficients for the Moral Values scale ranged from .91 for both the janitors-maintenance group and the assemblers-machinists group, to .96 for the engineers group. Reliabilities for the Achievement scale ranged from .66 for the salesmen to .75 for the janitors

<sup>19</sup> Fisher, S. T., Weiss, D. J., Dawis, R. V. A comparison of Likert and pair comparisons techniques in multivariate attitude scaling. Work Adjustment Project, July 1966 (mimeo).

and maintenancemen. The greatest variability among reliability coefficients was observed on the Ability Utilization scale (.69 to .79) and the Achievement scale (.66 to .75). For both scales the highest reliabilities were obtained for the janitors-maintenancemen group. On the other hand, relatively consistent reliability coefficients were obtained among the five occupational groups on the Activity and Supervision-Human Relations scales (the maximum difference among reliability coefficients being .02).

For the total group, all reliability coefficients were above .73. For the occupational groups, reliability coefficients fell below .72 in only four instances: for office clerks, salesmen and engineers on the Achievement scale, and for engineers on Ability Utilization.

These results indicate that, in general, the scales of the pair comparisons revision of the MIQ are reliable, i.e., internally consistent.

### Covariation

Scale intercorrelations for the pair comparisons MIQ are shown in Table 4. Median correlation was  $-.02$ . Correlations ranged from a high of .64 (for the Responsibility and Creativity scales) to .00 (for nine pairs of scales). Moderate correlations (.50 or greater) were also observed for the correlation of Company Policies and Practices with Supervision-Human Relations (.50); Ability Utilization with Achievement (.52); and between the two Supervision scales (.54). Slightly over half of the scale intercorrelations were negative.

A comparison of these results with those obtained on the Likert form of the MIQ shows that the pair comparisons form yields lower scale intercorrelations. For the Likert MIQ, development group correlations among scales ranged from .08 to .81, with a median of .50. All correlations among the Likert scales were positive.<sup>20</sup> These results indicate that the use of a pair comparisons form of scaling achieved one of the objectives in revising the MIQ, i.e., lowering scale intercorrelations or achieving greater independence of scale scores.

### Factorial Composition

The scale correlation matrix for the pair-comparisons MIQ was factor analyzed to determine the underlying dimensions of vocational

<sup>20</sup> *Minnesota studies in vocational rehabilitation*, XVI, op. cit., pp. 26-27.

Table 4. MIQ scale intercorrelation matrix, for total group

Scale	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Ability utilization																				
2. Achievement	52																			
3. Activity	00	-02																		
4. Advancement	23	26	-28																	
5. Authority	-07	-07	-04	02																
6. Company policies and practices	06	02	-21	04	-24															
7. Compensation	-17	-11	-10	10	-12	00														
8. Co-workers	-12	-06	03	-22	-12	03	08													
9. Creativity	29	24	00	05	18	-16	-27	-10												
10. Independence	-14	-20	43	-36	06	-23	-05	02	07											
11. Moral values	04	09	-16	-02	-14	16	-08	00	-06	-26										
12. Recognition	16	27	-18	20	10	-05	00	-18	12	-13	-13									
13. Responsibility	23	17	-01	11	33	-22	-23	-17	64	13	-10	17								
14. Security	-18	-16	08	05	-28	00	42	08	-36	04	-07	-13	-35							
15. Social service	09	08	10	-17	-02	-06	-26	10	01	01	08	-17	-04	-14						
16. Social status	-03	-02	-11	10	29	-18	-01	-07	00	-05	-10	21	07	-13	01					
17. Supervision— human relations	-03	-06	-16	01	-10	50	-01	-01	-08	-21	09	-04	-10	-10	-12	-14				
18. Supervision— technical	02	-10	-09	03	-15	41	-08	-02	-14	-13	04	-12	-20	-04	-03	-18	54			
19. Variety	-04	-02	38	-20	06	-24	-04	02	14	35	-21	-12	11	-01	06	-04	-20	-21		
20. Working conditions	-09	-08	01	-04	-26	19	26	20	-28	06	-18	-10	-32	45	-07	-11	00	08	00	

Note—Decimal points omitted.

needs representing a large amount of scale covariation. Orthogonal factors were extracted by a principal factor solution, using the Kaiser criterion for number of factors to extract, and rotated to a varimax solution. Results of the factor analysis are shown in Table 5.

Table 5 shows that three orthogonal factors were required to account for the common variance among the 20 MIQ scales. Factor I, accounting for 39% of common variance, is defined by five high loadings: Security, Compensation and Working Conditions have relatively high and positive loadings, while Creativity and Responsibility load negatively. There are also secondary negative loadings for Ability Utilization, Achievement and Authority. Factor I appears therefore to represent a bipolar "intrinsic-extrinsic" dimension of vocational needs, with the extrinsic pole defined by Security, Compensation and Working Conditions, and the intrinsic pole by Responsibility and Creativity.

Factor II is also a bipolar factor. One pole is defined by loadings for Advancement and Recognition, with secondary loadings for Achievement and Ability Utilization. The opposite pole is defined by Activity and Independence, with a secondary loading for Variety.

**Table 5. Varimax factor matrix of MIQ scales, for total group**

Scale	Factor			Communality	SMC*
	I	II	III		
1. Ability utilization	-.38	-.29	.05	.23	.35
2. Achievement	-.31	-.37	-.01	.23	.38
3. Activity	-.02	.51	-.23	.31	.33
4. Advancement	-.02	-.59	.00	.35	.31
5. Authority	-.31	-.04	-.28	.18	.27
6. Company policies and practices	.12	-.10	.64	.44	.39
7. Compensation	.52	-.18	-.12	.32	.28
8. Co-workers	.20	.20	.05	.08	.13
9. Creativity	-.64	-.05	-.18	.45	.48
10. Independence	-.02	.55	-.33	.41	.38
11. Moral values	-.06	-.09	.31	.10	.22
12. Recognition	-.15	-.43	-.16	.24	.23
13. Responsibility	-.64	-.09	-.29	.50	.51
14. Security	.66	.00	-.10	.45	.41
15. Social service	-.17	.22	.04	.08	.17
16. Social status	-.08	-.20	-.26	.12	.18
17. Supervision—human relations	-.01	-.03	.65	.43	.42
18. Supervision—technical	.04	.04	.62	.39	.38
19. Variety	-.08	.39	-.34	.27	.25
20. Working conditions	.54	.05	.04	.29	.34
Contribution of factor	2.28	1.65	1.93	5.86	
Proportion of common variance	.39	.28	.33	1.00	

Note—Decimal points omitted.

\* Estimated communalities: squared multiple correlation coefficients.

This factor appears to define another "intrinsic-extrinsic" dimension, but one different from Factor I.

Factor III is a unipolar factor defined by Company Policies and Practices, and the two Supervision scales with a secondary positive loading on Moral Values. This factor seems to relate to the company and management as a source of reinforcement.

The three factors extracted accounted for only 29.3% of the total variance in the 20 MIQ scales. Since the median reliability coefficient indicated that about 82% of scale variance was reliable, this means that over 50% of the variance of MIQ scale scores was reliable *specific* variance. Thus, factor scores for the three factors would represent only a small portion of the reliable scale score variance. Because of this potential loss of information, the 20 scale scores rather than factor scores were used in further analyses.

Comparison of factor analytic results for the pair comparisons MIQ and the Likert MIQ indicates that there are considerable differences in the data obtained through the two instruments. The Likert data yielded two unipolar factors accounting for 57% of the total variance.<sup>21</sup> The first factor was a "general" factor accounting for 69% of the common variance. Emergence of a "general" factor was probably due, in part, to rating bias. The pair comparisons format seems to have eliminated the "general" factor, while at the same time yielding bipolar factors of relatively equal contribution, but accounting for much less of the total variance.

### Occupational Group Differences

An essential characteristic of an instrument purporting to measure vocational needs is its ability to differentiate among groups in meaningful ways. Initial studies on the Likert MIQ demonstrated that instrument's capacity to differentiate among occupational groups in terms of both level and variability.<sup>22</sup> Occupational differences on the pair comparisons MIQ were studied both in terms of level (mean differences) and variability (variance differences).

**Level.** One-way analysis of variance was used to test the significance of occupational group mean differences on each of the 20 MIQ scales. This analysis is summarized in Table 6.<sup>23</sup>

<sup>21</sup> Ibid., pp. 27-28.

<sup>22</sup> Ibid., pp. 40-51.

<sup>23</sup> Analysis of variance was used to compare means for assemblers and machinists separately. Since no significant differences were found, the data for these two groups were combined.

Table 6. MIQ scale means, for total group and five occupational groups

Scale	Occupational Group						F(4,1371)	p <sup>b</sup>
	Total Group <sup>a</sup>	Janitors and Maintenancemen	Assemblers and Machinists	Office Clerks	Salesmen	Engineers		
1. Ability utilization .....	13.79	12.78	13.00	13.67	14.45	14.84	21.55	.001
2. Achievement .....	13.97	12.59	13.32	13.92	14.07	15.39	33.92	.001
3. Activity .....	6.16	7.27	6.74	5.99	6.56	4.86	16.25	.001
4. Advancement .....	13.33	12.17	12.44	14.29	13.54	14.08	17.27	.001
5. Authority .....	4.25	4.12	3.94	3.70	3.80	5.10	7.71	.001
6. Company policies and practices .....	10.06	9.88	9.91	10.52	10.06	10.07	0.95	.001
7. Compensation .....	9.53	10.13	10.18	9.91	8.55	9.03	6.99	.001
8. Co-workers .....	7.06	7.88	7.35	6.69	6.65	6.64	5.98	.001
9. Creativity .....	11.01	9.67	10.56	10.14	11.44	12.53	29.98	.001
10. Independence .....	4.92	6.29	5.91	4.76	5.02	3.22	29.79	.001
11. Moral values .....	10.48	9.31	8.36	10.23	10.25	13.23	32.41	.001
12. Recognition .....	10.44	9.47	10.18	10.06	10.36	11.49	10.94	.001
13. Responsibility .....	11.55	10.27	10.91	10.91	12.17	12.95	26.99	.001
14. Security .....	11.00	12.53	12.59	12.17	10.04	8.55	43.06	.001
15. Social service .....	8.96	9.35	8.83	9.03	10.19	8.08	7.15	.001
16. Social status .....	3.58	3.08	3.50	3.20	4.28	3.76	3.22	.05
17. Supervision—human relations .....	9.03	9.03	8.24	9.18	8.54	9.92	8.06	.001
18. Supervision—technical .....	8.00	8.27	7.33	8.92	8.23	7.64	5.50	.001
19. Variety .....	6.78	7.57	8.29	5.73	6.04	6.06	20.74	.001
20. Working conditions .....	9.67	11.04	11.72	9.86	9.01	7.31	66.14	.001

<sup>a</sup> Includes 54 individuals whose jobs were not classifiable into the five occupational groups.<sup>b</sup> Probability of error in rejecting the null hypothesis of no differences between group means, if  $p \leq .05$ .

For the total group ( $N = 1,430$ ), mean scale scores were highest on Achievement and Ability Utilization and lowest on Social Status, Authority and Independence. Similar rankings of scale means were observed for the five occupational groups. On a scale-by-scale comparison of occupational groups, statistically significant mean differences were found for 19 of the 20 scales, Company Policies and Practices being the sole exception. Of the 19 significant differences, 18 were significant beyond the .001 level. Only the finding for the Social Status scale was significant at a lower (i.e., .05) level.

The janitors-maintenancemen group had the highest means on three scales: Activity, Co-workers and Independence. The assemblers-machinists group means were highest on Compensation, Security, Variety and Working Conditions. Office clerks were highest on Advancement and Supervision-Technical, as well as on Company Policies and Practices (although group means for the latter scale did not differ significantly). Salesmen mean scores were highest on Social Service and Social Status. Engineers obtained the highest means on the eight remaining scales: Ability Utilization, Achievement, Authority, Creativity, Moral Values, Recognition, Responsibility and Supervision-Human Relations.

These results suggest that, for the two blue-collar groups, the "extrinsic" types of reinforcers are more important, while "intrinsic" types of reinforcers are valued more in the higher level jobs (e.g., engineers). These observations suggest that the pair comparisons MIQ differentiates among occupational groups in ways which appear to be meaningful, at least in terms of common expectations concerning occupational reinforcement. The results are also generally comparable with the results of the analysis of mean differences for the Likert MIQ.<sup>24</sup>

**Variability.** Occupational differences in MIQ scale variances are shown in Table 7. For the total group, the most variability in scores was obtained on the Moral Values scale, and the least variability on the Achievement scale. The same finding was observed for most of the occupational groups: Moral Values had the highest variability and Achievement the lowest.

On a scale-by-scale comparison of occupational group variability, statistically significant differences were found on 6 of the 20 MIQ

<sup>24</sup> *Minnesota studies in vocational rehabilitation*, XVI, p. 42, op. cit.

Table 7. MIQ scale variances for total group and five occupational groups

Scale	Total Group <sup>a</sup>	Occupational Group					Chi-square <sup>b</sup>	p <sup>c</sup>
		Janitors and Maintenance men	Assemblers and Machinists	Office Clerks	Salesmen	Engineers		
1. Ability utilization .....	11.91	15.28	13.20	11.32	9.63	7.56	45.61	.001
2. Achievement .....	11.16	13.93	12.10	9.36	8.94	7.04	43.57	.001
3. Activity .....	17.53	18.23	19.05	17.29	16.24	14.25	8.58	
4. Advancement .....	15.57	17.96	19.67	13.19	12.93	10.41	43.42	.001
5. Authority .....	14.00	12.86	14.50	11.03	12.75	15.49	9.43	
6. Company policies and practices .....	16.34	16.85	17.00	16.44	13.77	16.42	3.14	
7. Compensation .....	19.84	18.89	20.52	18.02	20.70	19.56	1.57	
8. Co-workers .....	13.79	12.98	14.54	12.98	12.58	13.22	1.76	
9. Creativity .....	14.42	16.31	13.43	14.17	13.31	10.75	13.92	.01
10. Independence .....	17.30	21.01	14.57	16.21	18.84	11.81	29.82	.001
11. Moral values .....	39.58	31.53	32.27	40.31	36.77	40.42	8.00	
12. Recognition .....	16.77	16.98	18.21	17.89	15.08	13.68	9.40	
13. Responsibility .....	14.42	13.32	14.56	15.28	13.52	11.34	8.26	
14. Security .....	27.47	20.75	23.59	24.84	27.94	24.85	5.17	
15. Social service .....	22.92	18.46	22.83	21.87	25.98	23.82	7.28	
16. Social status .....	16.00	13.02	15.50	13.88	21.86	16.32	18.02	.01
17. Supervision—human relations .....	17.60	19.28	17.90	17.09	17.58	15.76	3.28	
18. Supervision—technical .....	18.90	17.28	18.76	19.25	17.79	19.57	1.46	
19. Variety .....	18.33	16.41	20.66	16.25	15.18	16.96	7.85	
20. Working conditions .....	18.25	14.90	15.87	16.88	14.71	14.35	2.34	

<sup>a</sup> Includes 54 individuals whose jobs were not classifiable into the five occupational groups.<sup>b</sup> Chi-square value of Bartlett's test of homogeneity of variance, with 4 degrees of freedom.<sup>c</sup> Probability of error in rejecting null hypothesis of no differences between group variances, if  $p \leq .05$ .



scales. On five of these scales (Ability Utilization, Achievement, Advancement, Creativity and Independence) the engineer group had the lowest variance and, with the exception of the Advancement scale, the janitors-maintenance group had the highest variance. On the Social Status scale, janitors-maintenance had the lowest variance, while salesmen had the highest. For four of these six MIQ scales—Ability Utilization, Achievement, Advancement and Creativity—significant occupational differences in variability were observed for both the Likert and the pair comparisons forms of the MIQ.<sup>25</sup> However, occupational differences in variability were observed for twelve scales on the Likert MIQ but not on the pair comparisons form, and for two scales on the pair comparisons MIQ but not on the Likert form. Finally, scale variances on the pair comparisons form were generally greater than those on the Likert form.

### Summary

The pair comparisons MIQ was developed to improve upon some of the psychometric deficiencies of the Likert form of the MIQ, principally the moderately high scale intercorrelations and the relatively small variance of scale scores. The data show that these objectives were achieved to a large extent.

It was found that scale intercorrelations were lowered by the use of the pair comparisons format, with a resulting change in factor structure. Factor analysis of the pair comparisons MIQ data failed to yield the prominent "general" factor obtained on the Likert form. The pair comparisons form also tended to yield bipolar factors. These results suggest that rating bias was reduced by the pair comparisons format.

Scale means on the pair comparisons form were generally closer to the midpoint of the potential range of scale scores, and scale variances were generally larger, suggesting that differentiating among individuals can be accomplished better with the pair comparisons form than with the Likert form. Scale reliabilities for the pair comparisons scales were of the same order as those for the Likert scales and were relatively uniform for different occupational groups.

<sup>25</sup> Ibid., pp. 42-43.

The pair comparisons form of the MIQ was also capable of differentiating among occupational groups in what appeared to be meaningful ways. Some of the occupational group differences were similar to those obtained with the Likert form.

Finally, the pair comparisons format yields an inconsistency score which can be used to detect random responding by a subject, thus identifying one source of error in scale scores.

These findings, then, suggest that the pair comparisons revision of the MIQ is psychometrically superior to the Likert form.

## Vocational Abilities

According to the *Theory of Work Adjustment*, vocational abilities are "dimensions of response measurable through the application of psychological testing procedures, principally by ability and aptitude tests."<sup>26</sup> Research on the General Aptitude Test Battery (GATB) of the United States Employment Service, indicates that this test battery has consistently shown meaningful relationships with vocational criteria, particularly various indicators of satisfactoriness.<sup>27</sup> Because of their demonstrated success in vocational prediction, GATB tests, specifically the eight paper and pencil tests, were chosen as measures of vocational abilities for the Work Adjustment Project.

The full GATB (Form B-1002-B) consists of eight paper and pencil ability tests and four apparatus tests. These twelve tests normally are scored on nine ability ("aptitude") dimensions: General Intelligence, Verbal, Numerical, Spatial, Perceptual, Clerical, Eye and Hand Coordination, Manual Dexterity, and Finger Dexterity. The latter two ability dimensions—Manual and Finger Dexterity—are measured by the use of apparatus tests, two for each ability. The remaining eight tests are pencil and paper tests measuring the other seven ability dimensions. Of the seven dimensions, three (General Intelligence, Numerical and Perceptual) are scored from a combination of two or more of the eight tests. This combining of test scores into aptitude dimension scores would tend spuriously to increase inter-correlations among the aptitude scores. Since independence of scores was desired for the purposes of the Work Adjustment

<sup>26</sup> *Minnesota studies in vocational rehabilitation*, XV, p. 9. op. cit.

<sup>27</sup> United States Dept. of Labor. *Guide to the use of the General Aptitude Test Battery*. Section III: Development, 1958.

Project, the GATB paper and pencil tests were not scored on the usual aptitude dimensions. In addition, because of problems in the administration of apparatus tests to large groups of individuals, these tests (pegboard and finger dexterity boards, measuring Manual and Finger Dexterity) were not used.

Using number of correct responses on the test as the score, the ability scores derived from the GATB paper and pencil tests were as follows:

1. Clerical ability: GATB part 1
2. Computational ability: GATB part 2
3. Spatial ability: GATB part 3
4. Verbal ability: GATB part 4
5. Discriminative ability: GATB part 5
6. Arithmetic ability: GATB part 6
7. Perceptual ability: GATB part 7
8. Sensorimotor ability: GATB part 8

In addition to these eight GATB tests a ninth test was added to measure mechanical ability. The test chosen for this purpose was selected from French's *Kit of Reference Tests for Cognitive Factors*.<sup>28</sup> Entitled "Tool Knowledge Test," this test was developed by the Educational Testing Service (ETS) for research use in measuring the "mechanical knowledge" reference factor. Each item in the Tool Knowledge Test consists of one picture of tools or equipment as the item stem and four pictures of tools as the response alternatives. The individual is instructed to determine "which piece of equipment shown in the pictures on the right is most commonly used with the piece of equipment pictured at the left." Score on the test is the number of correct responses. The test was used as developed by ETS, with the exception of a change in time limits. Instead of allowing five minutes for each of two parts (each consisting of fifteen items), the entire 30-item test was administered under a five-minute time limit.

Table 8 shows the sample sizes for the ability test analyses. Complete ability test data were obtained for a total of 1,434 men. The occupational distribution showed engineers to be the largest

<sup>28</sup> French, J. *Kit of reference tests for cognitive factors*. Princeton, New Jersey: Educational Testing Service, 1965.

**Table 8. Sample sizes for ability test analyses**

Group	N
Janitors and maintenancemen	247
Assemblers and machinists	325
Office clerks (includes general office clerks, accounting clerks, bookkeepers and business machine operators)	225
Salesmen (retail and wholesale)	205
Engineers (graduate professional engineers)	384
Miscellaneous	48
Total	1434

group ( $N = 384$ ) and salesmen the smallest ( $N = 205$ ). Of the total group of 1,434, there were 48 individuals in jobs which did not fit into the five occupational categories.

### Test Reliability

Split-half reliability coefficients were estimated, using a formula developed by Rulon,<sup>29</sup> for eight of the nine ability tests (the exception was the sensorimotor ability test). The split-half reliability coefficient was estimated from scores for the odd-numbered and the even-numbered items. (The last item was not scored for individuals answering an odd number of items.) These scores were used in the following formula:

$$\text{Reliability} = 1 - \frac{\text{error variance}}{\text{total variance}}$$

where error variance is defined as the variance of the *difference* scores between odd and even halves of the test, and total variance is the variance of the total scores (sum of the odd and even scores). This formula is identical to the Hoyt formula used in the MIQ analyses, except for the difference in operationalizing the variance components.

Split-half reliability coefficients for the total group and the five occupational groups are shown in Table 9, for eight of the nine ability tests. (Reliability coefficients were not computed for the sensorimotor ability test since it has no right or wrong answers, and therefore the common methods of estimating reliability are not applicable.) For the total group, reliability coefficients varied from

<sup>29</sup> Rulon, P. J. A simplified procedure for determining the reliability of a test by split-halves. *Harvard Educational Review*, 1939, 9, 99-103.

**Table 9. Split-half reliability coefficients<sup>a</sup> for ability tests, for total group and five occupational groups**

Test	Occupational Group					
	Total Group <sup>b</sup>	Janitors and Maintenance-men	Assemblers and Machinists	Office Clerks	Salesmen	Engineers
1. Clerical ability .....	.98	.97	.97	.98	.98	.98
2. Computational ability .....	.97	.95	.94	.94	.94	.96
3. Spatial ability .....	.94	.91	.92	.90	.92	.93
4. Verbal ability .....	.96	.94	.94	.95	.94	.94
5. Discriminative ability .....	.98	.96	.97	.98	.97	.97
6. Arithmetic ability .....	.94	.91	.86	.89	.88	.91
7. Perceptual ability .....	.95	.94	.94	.94	.93	.95
8. Sensorimotor ability .....	°	°	°	°	°	°
9. Tool knowledge .....	.88	.93	.83	.84	.86	.82

<sup>a</sup> Estimated by formula developed by Rulon, P. J. A simplified procedure for determining the reliability of a test by split-halves. *Harvard Educational Review*, 1939, 9, 99-103.

<sup>b</sup> Includes 48 individuals whose jobs were not classifiable into the five occupational groups.

<sup>c</sup> Not estimated.

.88, for tool knowledge, to .98, for clerical ability and discriminative ability. Seven of the eight coefficients were .94 or higher, indicating a high degree of reliability for the ability tests for the total group.

There was little variation in reliability coefficients among the occupational groups. On two tests, clerical and verbal ability, the largest difference among the coefficients was .01, and for the computational, spatial, discriminative and perceptual ability tests, it was no more than .03. The largest difference in reliabilities among the occupational groups was observed for the Tool Knowledge Test, for which the lowest reliability, .82, was obtained for engineers, and the highest, .93, for janitors and maintenancemen. The results in Table 9 show, in general, that the ability tests used had uniformly high reliabilities, with some slight differences among occupational groups, principally on the Tool Knowledge Test.

## Covariation

Ability test intercorrelations are shown in Table 10, based on data for the total group. The highest correlation was .84, between arithmetic ability and computational ability. Lowest correlation

Table 10. Ability test intercorrelations for total group

Test	1	2	3	4	5	6	7	8	9
1. Clerical ability .....									
2. Computational ability .....	.76								
3. Spatial ability .....	.55	.55							
4. Verbal ability .....	.70	.70	.55						
5. Discriminative ability .....	.68	.64	.62	.53					
6. Arithmetic ability .....	.73	.84	.58	.74	.59				
7. Perceptual ability .....	.65	.61	.68	.56	.69	.58			
8. Sensorimotor ability .....	.58	.56	.42	.52	.51	.54	.52		
9. Tool knowledge .....	.09	.09	.39	.13	.16	.13	.27	.04	

Note—Decimal points omitted.

was .04 between tool knowledge and sensorimotor ability. Median correlation was .56. In general, the ability tests of the GATB were relatively highly correlated. Considering the intercorrelations of only the GATB tests (tests 1 through 8), the average intercorrelation was .59, with a range of .42 to .84. The lowest correlation among GATB tests was between sensorimotor ability and spatial ability ( $r = .42$ ).

The highest correlation between the Tool Knowledge Test and any GATB test was .39, with spatial ability. The remaining correlations between tool knowledge and GATB tests were low, with a median of .13 for the eight coefficients. The low correlations between the Tool Knowledge Test and the GATB tests may be partially explained by the fact that the majority of the individuals did not complete all the items for most of the GATB tests, while on the Tool Knowledge Test, most of the respondents completed all items. Therefore, the GATB test scores probably had a substantial speed component while the speed component in the Tool Knowledge Test scores was probably insignificant. It is worth noting that the highest correlation of the Tool Knowledge Test is with spatial ability, which according to the GATB manual is more a power test than a speed test,<sup>30</sup> and its lowest correlation is with sensorimotor ability, which is known to have a large speed component.

### Factorial Composition

The correlation matrix for ability tests for the total group was factor-analyzed, using a principal factor solution and the

<sup>30</sup> *Guide to the use of the General Aptitude Test Battery*. Section III, p. B-2. op. cit.

Kaiser criterion for factor extraction, to determine the minimum number of factors needed to account for scale covariation. The factor analysis yielded one factor. The principal factor loadings are shown in Table 11.

**Table 11. Principal factor matrix of ability tests,  
for total group**

Scale	Factor I	Communality	SMC <sup>a</sup>
1. Clerical ability	85	72	70
2. Computational ability	86	74	76
3. Spatial ability	73	54	59
4. Verbal ability	78	62	62
5. Discriminative ability	77	60	61
6. Arithmetic ability	85	73	76
7. Perceptual ability	78	62	63
8. Sensorimotor ability	64	42	41
9. Tool knowledge	21	04	20
Contribution of factor	5.02	5.02	
Proportion of common variance	1.00	1.00	

Note—Decimal points omitted.

<sup>a</sup> Estimated communalities: squared multiple correlation coefficients.

The highest loadings in the factor were for computational ability, clerical ability and arithmetic ability. Relatively high loadings were observed for all other GATB tests, the lowest being a loading of .64 for sensorimotor ability. The lowest loading on the factor, however, was .21 for the Tool Knowledge Test. The common factor accounted for about 56% of the total variance in the nine tests.

Because of its high loadings in the numerical-clerical tests, this factor might be termed a "general speed" factor. While it is a "general" factor in the sense that almost all variables loaded significantly on it and it was the only factor to emerge from the analysis, it is quite different from the "general intelligence" factor sometimes found in ability tests. "General intelligence" usually has its highest loadings in the verbal tests, compared with the numerical-clerical loadings found highest in this analysis.

### Occupational Group Differences

The five occupational groups were compared in terms of level (means) and variability (variances). Group differences in both

characteristics were tested separately for each of the nine ability tests.<sup>31</sup>

**Level.** Results for the one-way analysis of variance to test differences among occupational group means are shown in Table 12. Statistically significant mean differences were obtained at the .001 level for all nine tests. For all the tests, the highest mean score was observed for engineers, and the lowest for janitors and maintenancemen, with the exception of tool knowledge for which the lowest mean was obtained by the office clerks.

**Variability.** Occupational group differences in variability for the nine ability tests are shown in Table 13. Statistically significant differences in group variances were obtained for four of the nine tests: at the .001 level for computational ability, spatial ability and tool knowledge, and at the .05 level for arithmetic ability. On these four tests, the engineers were the least variable. On computational ability, arithmetic ability and tool knowledge, the janitors and maintenancemen were the most variable. Salesmen were the most variable on spatial ability. No significant differences in variability were observed on the remaining five ability tests (clerical, verbal, discriminative, perceptual, and sensorimotor abilities).

## Summary

Analyses of the ability test scores show that the ability tests used in this study represent highly reliable dimensions of vocational abilities. While the tests appear to be reliable, they measure highly intercorrelated dimensions of ability. Factor analysis produced a single general factor related primarily to the speed component of the GATB tests. Analyses also indicated that the ability tests differentiated among occupational groups. However, these differences tended to be similar for all ability tests (probably a function of the high intercorrelations) and were not as occupationally differentiating as was expected.

## Predictor Variable Relationships

While the *Theory of Work Adjustment* conceptualizes abilities and needs as separate systems of variables, it implicitly hypothesizes

<sup>31</sup> Differences in both means and variances were tested separately for assemblers and machinists. Since no differences were found, the data for the two groups were combined.



Table 12. Ability test means, for total group and five occupational groups

Scale	Total Group <sup>a</sup>	Occupational Group					F(4,1381)	p <sup>b</sup>
		Janitors and Maintenance	Assemblers and Machinists	Office Clerks	Salesmen	Engineers		
1. Clerical ability .....	47.42	36.37	40.02	52.12	49.00	57.46	156.61	.001
2. Computational ability .....	24.16	18.21	20.76	25.86	25.69	29.23	208.41	.001
3. Spatial ability .....	20.46	16.65	19.05	19.46	18.94	25.50	110.12	.001
4. Verbal ability .....	22.97	16.17	18.45	24.40	23.50	30.25	182.56	.001
5. Discriminative ability .....	26.25	21.92	24.18	27.20	27.34	29.78	70.59	.001
6. Arithmetic ability .....	13.40	10.18	11.24	13.65	13.65	17.03	250.71	.001
7. Perceptual ability .....	26.10	21.24	24.44	26.47	25.63	30.81	84.19	.001
8. Sensorimotor ability .....	67.70	60.58	62.65	70.68	69.97	73.57	94.78	.001
9. Tool knowledge .....	26.27	26.42	27.35	23.98	24.61	27.45	43.56	.001

<sup>a</sup> Includes 48 individuals whose jobs were not classifiable into the five occupational groups.

<sup>b</sup> Probability of error in rejecting null hypothesis of no difference between group means, if  $p \leq .05$ .

Table 13. Ability test variances, for total group and five occupational groups

Scale	Total Group <sup>a</sup>	Occupational Group					Chi-square <sup>b</sup>	p <sup>c</sup>
		Janitors and Maintenance	Assemblers and Machinists	Office Clerks	Salesmen	Engineers		
1. Clerical ability	211.58	148.04	131.33	170.25	161.35	138.49	6.10	
2. Computational ability	45.09	39.88	25.49	29.66	28.12	22.26	28.41	.001
3. Spatial ability	44.33	35.46	37.37	35.70	38.13	24.87	20.07	.001
4. Verbal ability	80.79	53.61	55.06	58.68	55.76	47.24	4.13	
5. Discriminative ability	47.64	42.72	37.92	43.17	42.28	36.80	3.28	
6. Arithmetic ability	15.61	10.93	9.14	9.75	9.26	7.55	11.20	.05
7. Perceptual ability	56.54	51.43	45.77	44.10	48.87	40.51	5.05	
8. Sensorimotor ability	124.79	95.94	90.12	115.81	103.39	92.30	5.43	
9. Tool knowledge	17.18	21.24	10.23	20.97	21.07	9.42	100.39	.001

<sup>a</sup> Includes 48 individuals whose jobs were not classifiable into the five occupational groups.

<sup>b</sup> Chi-square value of Bartlett's test of homogeneity of variance, with 4 degrees of freedom.

<sup>c</sup> Probability of error in rejecting null hypothesis of no difference between group variances, if  $p < .05$ .

some relationships between abilities and needs. According to this theory,

The strength of a particular ability, relative to other abilities, will depend on the individual's response potential, previous opportunities for responding and the relative reinforcement value(s) of the reinforcer(s) associated with his responding. The strength of a particular need, relative to the individual's other needs, will depend on the frequency with which the reinforcer has been associated with the individual's responding, and on the relative strength of the ability with which the reinforcer has been primarily associated.<sup>32</sup>

Thus, while requiring that needs and abilities be measured independently, the *Theory of Work Adjustment* also postulates that needs and abilities are interdependent variables. Certain needs can be associated with the development of specific abilities, and conversely, the development of specific needs may be associated with certain abilities. It can be expected, therefore, that some relationship exists between measured needs and measured abilities, although the magnitude of this relationship should be less than that within either set of variables.

### Need-Ability Cross-correlations

Cross-correlations between MIQ scales and ability tests for the total group are shown in Table 14. The highest correlation was .39, between the MIQ Recognition scale and sensorimotor ability. The next highest correlations (.30 or greater) were between Achievement and verbal ability, and Recognition and arithmetic ability. The remaining correlations were less than .30. More than half of the correlations were between .10 and  $-.10$ . The highest average correlation of an MIQ scale with ability tests was  $-.22$  for Independence, followed by Ability Utilization, Achievement, Advancement, and Working Conditions (all averaging close to .20).

Cross-correlations between MIQ scales and ability tests for each of the five occupational groups are presented in Appendix Tables A-1 through A-5. In general, the magnitude of the correlations was similar for the different occupational groups. For all groups, the majority of the correlations between needs and abilities were lower than the intercorrelations among needs or among abilities. These

<sup>32</sup> *Minnesota studies in vocational rehabilitation*, XV, pp. 6-7, op. cit.

Table 14. Cross-correlations between MIQ scales and ability tests, for total group

MIQ Scale	Ability Test								
	Clerical	Computational	Spatial	Verbal	Discriminative	Arithmetic	Perceptual	Sensorimotor	Mechanical Knowledge
1. Ability utilization	24	26	22	27	22	21	24	03	04
2. Achievement	23	25	23	30	19	22	22	06	04
3. Activity	-15	-20	-15	-22	-13	-15	-13	03	06
4. Advancement	20	25	17	20	21	16	18	04	-03
5. Authority	04	02	04	-02	04	04	03	02	-03
6. Company policies and practices	03	08	01	09	00	08	01	05	04
7. Compensation	-05	-02	-05	00	-03	-05	-03	-08	-03
8. Co-workers	-07	-06	-03	-07	-02	-08	-07	-06	-03
9. Creativity	16	17	21	18	16	19	17	08	09
10. Independence	-23	-27	-25	-29	-21	-26	-21	-14	-09
11. Moral values	17	19	19	29	15	22	15	06	02
12. Recognition	16	10	08	10	04	30	04	39	28
13. Responsibility	18	21	18	19	19	17	18	03	02
14. Security	-17	-17	-18	-19	-13	-22	-15	-12	06
15. Social service	-04	-07	-10	-08	-03	-09	-03	-06	-10
16. Social status	-01	-04	-06	-03	-03	-02	-05	-01	-15
17. Supervision—human relations	04	10	06	10	06	06	09	-02	-01
18. Supervision—technical	-01	01	-04	-02	-01	-04	-02	-04	04
19. Variety	-12	-18	-07	-14	-10	-17	-05	-09	-01
20. Working conditions	-24	-21	-18	-22	-18	-26	-16	-17	-04

Note—Decimal points omitted.

results indicate that, in general, needs and abilities were not highly related.

The data for the clerical group (Table A-3), however, yielded some deviations from this general finding. While the majority of the correlations between needs and abilities for the clerks were also between .10 and  $-.10$ , some moderate and high correlations were observed between three MIQ scales (Recognition, Activity, and Company Policies and Practices) and three ability tests (arithmetic, sensorimotor and verbal). The Recognition scale correlated higher than .70 with the three ability tests, while Activity and Company Policies and Practices correlated between .32 and .42 with the three ability tests.

### Canonical Correlation Analysis

While the bivariate correlation analysis showed specific relationships between MIQ scale scores and ability test scores, this did not answer completely the question as to whether the set of need measures was related to the set of ability measures. To investigate the relationship between sets of variables, canonical correlation analysis is the appropriate technique. This analytic method yields a single correlation coefficient which reflects the maximum relationship between the two sets of variables. It is an extension of multiple correlation to problems involving multiple criteria. Either set of variables can be considered as predictors or criteria in canonical correlation. In addition to yielding a canonical correlation coefficient which indicates the maximum relationship between the two sets of variables, the method yields two sets of weights or regression coefficients (one for each set of variables) which can be used to obtain "predicted scores" for each individual on each set of variables. The canonical correlation is the correlation between the two "predicted scores" (or "canonical variates"), predicted from the two sets of variables. Its interpretation is similar to that of a multiple correlation coefficient. The standardized regression coefficients for each set of variables indicate which variables contribute most to the relationship between the two sets of variables.

Results of the canonical correlation analysis, for total group and five occupational groups, are shown in Table 15. For the total group, the canonical correlation between MIQ scales and ability tests was .58, indicating that 34% of the variance in one set of variables is predictable from the other. The largest regression coefficient for

**Table 15. Maximum canonical correlation of MIQ scales and ability tests, and normal regression coefficients for prediction of the canonical variates, for total group and five occupational groups**

Coefficient	Occupational Group					
	Total Group (N = 1398)	Janitors and Maintenance men (N = 231)	Assemblers and Machinists (N = 315)	Clerks (N = 221)	Salesmen (N = 199)	Engineers (N = 379)
Maximum canonical correlation	58	51 <sup>a</sup>	53	90	54	40
Regression coefficients:						
MIQ scales						
1. Ability utilization	—34	..... <sup>b</sup>	—29	00	—31	02
2. Achievement	—30	.....	—20	—12	—02	—07
3. Activity	21	.....	06	37	—02	08
4. Advancement	—11	.....	02	—05	—07	—04
5. Authority	04	.....	03	07	—06	07
6. Company policies and practices	00	.....	—01	35	—06	—05
7. Compensation	—23	.....	—19	09	01	—54
8. Co-workers	—05	.....	00	08	11	—25
9. Creativity	—09	.....	—07	24	01	—02
10. Independence	34	.....	44	—03	36	—15
11. Moral values	—46	.....	—14	01	—52	—59
12. Recognition	07	.....	31	76	—01	—04
13. Responsibility	—32	.....	—18	—18	—18	—40
14. Security	22	.....	15	10	36	09
15. Social service	25	.....	20	05	39	—04
16. Social status	14	.....	59	07	04	04
17. Supervision—human relations	—16	.....	01	—09	—18	07
18. Supervision—technical	15	.....	19	02	27	—06
19. Variety	04	.....	09	—02	17	00
20. Working conditions	24	.....	—18	—05	16	—24
Ability tests						
1. Clerical ability	20	.....	39	07	44	34
2. Computational ability	—18	.....	—04	—03	—17	07
3. Spatial ability	—25	.....	—32	11	—35	06
4. Verbal ability	—74	.....	—70	—32	—65	—64
5. Discriminative ability	—08	.....	—10	—02	—30	01
6. Arithmetic ability	—44	.....	—04	94	14	—51
7. Perceptual ability	—10	.....	—09	—05	06	—25
8. Sensorimotor ability	31	.....	22	02	—31	30
9. Mechanical knowledge	—03	.....	—43	00	—15	24

Note—Decimal points omitted.

<sup>a</sup> This coefficient represents an estimate of the canonical correlation, because of failure of the iterative procedure to converge.

<sup>b</sup> Regression coefficients not available because of failure of iterative procedure to converge.

the MIQ scales was for Moral Values ( $-.46$ ) with relatively large regression coefficients for Ability Utilization ( $-.34$ ) and Independence ( $.34$ ). For the ability tests, the largest regression coefficient was for verbal ability ( $-.74$ ).

For the five occupational groups, the canonical correlation coefficients varied from .40 for the engineers, to .90 for the clerks. These results indicate that from 16% to 81% of the variance in one set of variables is predictable from the other set, depending on the occupational group. Examination of the regression coefficients shows that Social Status (.59) and verbal ability ( $-.70$ ) made the greatest contributions for the assemblers and machinists; Recognition (.76) and arithmetic ability (.94) for the clerks; Moral Values ( $-.52$ ) and verbal ability ( $-.65$ ) for the salesmen; and Moral Values ( $-.59$ ) and verbal ability ( $-.64$ ) for the engineers. Thus, for three of the occupational groups, verbal ability had the highest regression coefficient, and for two of these Moral Values had the highest regression coefficient.

As the cross-correlation analysis previously showed, the group of clerks was most different from the other occupational groups, in terms of need-ability relationships. While for engineers, salesmen, assemblers and machinists, and janitors and maintenancemen, the relationship between needs and abilities was only moderate, for the group of clerks it was quite high. In addition, the regression coefficients for the other groups tended to be similar to each other, while a completely different pattern of coefficients appeared for the clerks.

## Summary

The analyses relating MIQ scales and ability tests tended to support the *Theory of Work Adjustment*. The bivariate relationships between needs and abilities were low, in general. Correlating the set of need variables with the set of ability variables yielded coefficients indicating moderate relationships between the two sets of variables, for the total group and four of the occupational groups. The analyses also indicated that the relationship between needs and abilities was different for the clerk group. For this group, a high relationship was found between the two sets of variables, and a different pattern of regression coefficients relating the two sets of variables was obtained. High bivariate correlations were also observed between some need scales and some ability tests for the clerk group.

## Criterion Variables

The *Theory of Work Adjustment* specifies two variables as the indicators of work adjustment: satisfaction and satisfactoriness. An individual is considered "work adjusted" if he is both satisfied and satisfactory. Varying degrees of lack of work adjustment are indicated by different combinations of lack of satisfaction and lack of satisfactoriness. For example, an individual may evaluate his work environment as highly satisfying, yet the employer's evaluation of the individual may indicate unsatisfactoriness. From the point of view of the individual, he is adjusted; from the employer's point of view, the individual is not adjusted. In other cases, the opposite may hold true: the employer may evaluate the individual as satisfactory, yet the individual's evaluation of the work environment may indicate dissatisfaction. The third possibility is where both individual and employer perceive a lack of adjustment, i.e., there is both dissatisfaction and unsatisfactoriness.

This conceptualization of work adjustment suggests that satisfaction and satisfactoriness are relatively independent of each other. The individual's evaluation of the environment (satisfaction) and the employer's evaluation of the individual (satisfactoriness) are not necessarily highly related. Previous work in operationalizing the *Theory of Work Adjustment* has supported this view. Scales for measuring satisfaction and satisfactoriness have been shown to be relatively independent of each other, both for single variable relationships and for the variables in combination.<sup>33</sup>

Considerable research has been devoted in the Work Adjustment Project to the measurement of satisfaction and satisfactoriness. Scales previously developed have subsequently undergone revision. The first instrument developed to measure satisfaction consisted of from five to eight scales, depending on the occupational group. This instrument had adequate reliabilities. However, scoring was extremely complex since different item response weights were used for different occupational groups. In addition, not all scales were scored for all groups. Another major weakness lay in the fact that practically all of the scales in this instrument measured satisfaction with environmental (i.e., extrinsic) factors (e.g., working conditions, supervision, co-workers, company) to the al-

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<sup>33</sup> *Minnesota studies in vocational rehabilitation*, XIV, pp. 31-40, op. cit.



most total exclusion of response-specific (i.e., intrinsic) factors (e.g., type of work, achievement, ability utilization). To serve as an appropriate criterion of work adjustment, it was desired that a satisfaction measure should include both intrinsic and extrinsic factors.

The second instrument developed to measure satisfaction, the Minnesota Satisfaction Questionnaire (MSQ), incorporated scales relevant to both intrinsic and extrinsic aspects of satisfaction.<sup>34</sup> Factor analysis of this 20-scale instrument yielded two factors of satisfaction—easily identifiable as intrinsic and extrinsic—accounting for 57% and 43% of common variance respectively. This questionnaire consisted of 100 items and required an administration time of about 20 minutes.

Initial Work Adjustment Project research on the measurement of satisfactoriness<sup>35</sup> yielded a two-scale instrument measuring two factors of satisfactoriness: performance and conformance. These two factors appeared consistently in factor analytic studies for all occupational groups studied. However, the instrument included an alternation ranking item which became cumbersome to complete when large groups of employees were involved. In addition, reliability coefficients obtained for the two scales were not wholly adequate. Reliability coefficients for the performance scale ranged from .77 to .85, and for the conformance scale, they were mostly in the high .70's. Furthermore, the possibility existed that additional aspects of satisfactoriness were not measured by this questionnaire.

The following sections report on subsequent revisions and improvements on these instruments.

## Satisfaction

Because the Work Adjustment Project depended on volunteer participants, it was important to shorten instrument administration time as much as possible within the limits set by research objectives and psychometric standards. Consequently, one concern of the research staff was to develop a short form of the MSQ.

A short form MSQ was constructed from twenty items, each item representing one of the 20 MSQ scales. The items chosen were

<sup>34</sup> *Minnesota studies in vocational rehabilitation*, XVIII, pp. 8-15, op. cit.

<sup>35</sup> *Minnesota studies in vocational rehabilitation*, XIV, op. cit.

those items which correlated most highly with their respective scale scores in the original MSQ development data. These items are:

1. *Ability utilization.* The chance to do something that makes use of my abilities.
2. *Achievement.* The feeling of accomplishment I get from the job.
3. *Activity.* Being able to keep busy all the time.
4. *Advancement.* The chances for advancement on this job.
5. *Authority.* The chance to tell other people what to do.
6. *Company policies and practices.* The way company policies are put into practice.
7. *Compensation.* My pay and the amount of work I do.
8. *Co-workers.* The way my co-workers get along with each other.
9. *Creativity.* The chance to try my own methods of doing the job.
10. *Independence.* The chance to work alone on the job.
11. *Moral values.* Being able to do things that don't go against my conscience.
12. *Recognition.* The praise I get for doing a good job.
13. *Responsibility.* The freedom to use my own judgment.
14. *Security.* The way my job provides for steady employment.
15. *Social service.* The chance to do things for other people.
16. *Social status.* The chance to be "somebody" in the community.
17. *Supervision-human relations.* The way my boss handles his men.
18. *Supervision-technical.* The competence of my supervisor in making decisions.
19. *Variety.* The chance to do different things from time to time.
20. *Working conditions.* The working conditions.

Directions for the short form of the MSQ are identical to those for the long form. The respondent is directed to ask himself: "On my present job, this is how I feel about (the item) . . . ." Five response alternatives are provided for each item: Very Dissatisfied; Dissatisfied; Neither (dissatisfied nor satisfied); Satisfied; and Very Satisfied. For scoring, these response alternatives are weighted 1 to 5 respectively.<sup>36</sup> Administration of the 20-item short form MSQ takes about five minutes.

### Scale Development

Using the short form MSQ, satisfaction data were obtained for a total group of 1,460 men. The occupational composition of this group is shown in Table 16. The largest group consisted of engineers ( $N = 390$ ), and the smallest, of assemblers ( $N = 76$ ).<sup>37</sup> Forty-nine of the total group of 1,460 men did not fit into the six occupational categories used.

**Table 16. Sample sizes for satisfaction analyses**

Group	N
Janitors and maintenancemen	258
Assemblers	76
Machinists	253
Office clerks (includes general office clerks, accounting clerks, bookkeepers and business machine operators)	229
Salesmen (retail and wholesale)	203
Engineers (graduate professional engineers)	390
Miscellaneous	49
Total	1,460

Item means and standard deviations for the 20 satisfaction items are shown in Table 17. For the total group, the highest mean was obtained on Security, while Advancement had the lowest mean. Relatively high means were also observed for Activity, Independence and Variety. Supervision-Human Relations and Advancement were the most variable items, and Moral Values the least variable. Low variabilities were also observed for Activity, Independence and Authority.

<sup>36</sup> A copy of the short form MSQ is in Appendix C, pp. 77-78.

<sup>37</sup> Assemblers and machinists were kept separate in these analyses because subsequent analysis of scale scores showed significant differences between these groups.

**Table 17. Satisfaction item means and standard deviations,  
for total group**

Item	Mean	Standard Deviation
1. Activity .....	4.24	.86
2. Independence .....	4.20	.86
3. Variety .....	4.24	.97
4. Social status .....	3.57	.94
5. Supervision—human relations .....	3.45	1.23
6. Supervision—technical .....	3.58	1.11
7. Moral values .....	4.16	.84
8. Security .....	4.40	.88
9. Social service .....	3.93	.92
10. Authority .....	3.68	.86
11. Ability utilization .....	3.81	1.18
12. Company policies and practices .....	3.24	1.10
13. Compensation .....	3.62	1.07
14. Advancement .....	3.11	1.22
15. Responsibility .....	4.07	.99
16. Creativity .....	4.04	1.01
17. Working conditions .....	3.95	1.03
18. Co-workers .....	3.96	.93
19. Recognition .....	3.50	1.07
20. Achievement .....	3.92	1.05

Note—Scales appear in the same order as in the questionnaire.

**Item Intercorrelations.** Intercorrelations among the twenty satisfaction items are given in Table 18. All correlations were positive, with a range from .16 to .73. High correlations were obtained between Creativity and Responsibility (.73); between the two Supervision items (.64); and between Achievement and Ability Utilization (.60). These high correlations are similar in magnitude to those obtained on the long form MSQ,<sup>38</sup> although in general the items intercorrelated at a lower level than did scale scores. Median item intercorrelation for the short form was .32, compared with a median scale intercorrelation for the long form of .45. In addition, the lowest correlation between items was .16, while that between scales was .21; and the highest correlation between items was .73, compared with .86 between scales. In general, however, the pattern and magnitude of intercorrelations among the short form MSQ items was similar to that among the long form MSQ scales.

**Factorial Composition.** The short form MSQ item correlation matrix was factor analyzed using a principal factor solution and

<sup>38</sup> *Minnesota studies in vocational rehabilitation, XVIII*, pp. 12-14, op. cit.

Table 18. Satisfaction item intercorrelations, for total group

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Activity																				
2. Independence	43																			
3. Variety	42	45																		
4. Social status	26	23	35																	
5. Supervision—human relations	22	25	23	22																
6. Supervision—technical	22	27	26	23	64															
7. Moral values	36	32	36	24	21	23														
8. Security	40	35	38	24	16	17	34													
9. Social service	28	31	39	40	16	21	28	33												
10. Authority	29	26	34	43	21	24	29	25	42											
11. Ability utilization	41	33	52	45	32	32	30	34	44	39										
12. Company policies and practices	16	19	23	26	45	44	24	18	23	24	35									
13. Compensation	22	20	29	26	33	30	21	26	18	22	37	34								
14. Advancement	23	19	32	36	34	36	19	17	21	33	47	40	46							
15. Responsibility	40	47	49	30	40	39	38	35	36	35	48	33	38	38						
16. Creativity	38	45	47	30	36	34	36	32	36	33	46	33	37	36	73					
17. Working conditions	24	32	31	22	33	30	33	30	26	27	32	38	32	32	41	40				
18. Co-workers	20	21	20	18	24	24	29	23	23	20	22	25	21	18	31	29	35			
19. Recognition	23	22	27	31	46	39	24	16	30	31	37	41	33	42	34	36	30	23		
20. Achievement	40	35	48	42	36	34	32	32	49	38	60	37	36	42	49	49	35	24	44	

Note—Decimal points omitted.

the Kaiser criterion. The resulting principal factor matrix was rotated to a varimax solution. The varimax matrix is shown in Table 19. The factor analysis yielded two common factors, which accounted for about 39% of the total variance. Factor I accounted for about 56% of the common variance, while Factor II accounted for the remaining 44%.

**Table 19. Varimax factor matrix of satisfaction items, for total group**

Item	Factor		Communality	SMC <sup>a</sup>
	I	II		
1. Activity	.59	-.13	.36	.35
2. Independence	.56	-.17	.35	.36
3. Variety	.66	-.20	.47	.44
4. Social status	.45	-.28	.28	.33
5. Supervision—human relations	.12	-.72	.54	.51
6. Supervision—technical	.16	-.67	.47	.47
7. Moral values	.49	-.20	.28	.28
8. Security	.54	-.10	.30	.29
9. Social service	.57	-.17	.35	.38
10. Authority	.47	-.26	.29	.32
11. Ability utilization	.60	-.38	.50	.52
12. Company policies and practices	.18	-.61	.40	.36
13. Compensation	.29	-.47	.30	.32
14. Advancement	.28	-.55	.39	.41
15. Responsibility	.62	-.41	.55	.61
16. Creativity	.60	-.39	.52	.58
17. Working conditions	.38	-.41	.31	.33
18. Co-workers	.29	-.28	.17	.20
19. Recognition	.26	-.57	.39	.37
20. Achievement	.58	-.42	.52	.52
Contribution of factor	4.36	3.38	7.74	
Proportion of common variance	.56	.44	1.00	

Note—Decimal points omitted.

<sup>a</sup> Estimated communalities: squared multiple correlation coefficients.

Factor I was defined by loadings for Variety (.66), Responsibility (.62), Ability Utilization (.60), Creativity (.60), Social Service (.57), and Independence (.56). Twelve of the twenty satisfaction items had relatively high loadings on Factor I. Factor II was defined primarily by the two Supervision items (Supervision—Human Relations,  $-.72$ , and Supervision—Technical,  $-.67$ ). Other items loading above .40 on this factor were Company Policies and Practices, Recognition, Advancement, Compensation, and Working Conditions, in that order. The only item of the 20 which did not load above .40 on either factor was Co-workers.

The results of this factor analysis are quite similar to that obtained on the 20-scale long form MSQ.<sup>39</sup> Thus, the first factor appears to be an intrinsic factor, concerned with response-specific reinforcers, while Factor II appears to be an extrinsic factor, relating to the work environment, primarily supervision.

**Factor Scores.** Individual satisfaction on the Factor I and Factor II dimensions was measured with the use of factor scores. Factor scores were developed in two ways: (1) exact factor scores were computed using the regression solution;<sup>40</sup> (2) integer factor scores were computed using only those items loading .40 or greater on a factor.<sup>41</sup> For integer factor scoring, Factor I items included Activity, Independence, Variety, Social Status, Moral Values, Security, Social Service, Authority, Ability Utilization, Responsibility, Creativity, and Achievement, while Factor II items included Supervision-

**Table 20. Means, standard deviations and Hoyt reliability coefficients of satisfaction exact factor scores and integer factor scores, for total group**

Scale	Mean	S.D.	Hoyt Reliability
Exact factor scores			
Factor I: Intrinsic	4.92	.84	.70
Factor II: Extrinsic	-3.40	1.01	.67
Integer factor scores			
Factor I: Intrinsic	48.27	7.53	.88
Factor II: Extrinsic	20.49	4.84	.80
General satisfaction score	76.67	12.09	.90

Human Relations, Supervision-Technical, Company Policies and Practices, Compensation, Advancement, and Recognition. Co-workers and Working Conditions were not included in either factor. Hoyt internal consistency reliability coefficients were also computed for the scores generated by each method. Descriptive statistics for the factor scores are shown in Table 20.

<sup>39</sup> Ibid., pp. 14-15.

<sup>40</sup> Several procedures have been developed for computing factor scores (see Harman, H. H. *Modern factor analysis*. Chicago: University of Chicago Press, 1960. Ch. 16). The most exact solution is a regression solution yielding a fractional weight for each variable on each factor. The observed score for each variable is multiplied by the appropriate fractional weights, and the resulting scores are then summed over all variables to yield a total score for an individual on a factor.

<sup>41</sup> Integer factor scores differ from exact factor scores in two ways: (1) only variables loading high on a factor are used in computing factor scores (in this study, .40 or greater); (2) observed scores on the variables defining a factor are summed as integer values, i.e., they are not multiplied by fractional weights.

As Table 20 shows, Hoyt reliability coefficients for the integer factor scores were much higher for both Factors I and II. Thus, a more adequate degree of reliability was achieved using integer factor scores, rather than exact factor scores, with this data. As a result, integer factor scores were used in further analyses involving the satisfaction scales.

A general satisfaction score was also computed which was the sum of item scores for all 20 MSQ short-form items. The reliability of the General Satisfaction Scale, as shown in Table 20 was .90.

Hoyt internal consistency reliability coefficients for the three satisfaction scales, computed separately for each of the six occupational groups, are shown in Table 21. These results indicate adequate

**Table 21. Hoyt reliability coefficients of satisfaction scales, for six occupational groups**

Occupational group	Scale		
	Factor I Intrinsic	Factor II Extrinsic	General Satisfaction
Janitors and maintenancemen .....	.86	.78	.88
Assemblers .....	.83	.80	.87
Machinists .....	.86	.81	.89
Clerks .....	.87	.78	.90
Salesmen .....	.89	.79	.90
Engineers .....	.91	.82	.93

reliabilities for each of the groups. The lowest coefficient was .78 for janitors and maintenancemen, and clerks, on Factor II. The largest between-group difference in reliabilities was for Factor I, between assemblers (.83) and engineers (.91). In general, Factor II scores were less reliable than either Factor I or General Satisfaction, but this could be due to the number of items in the scales. The highest reliability coefficients for the three scales were obtained for the engineer group.

Intercorrelations among the three satisfaction scales are shown in Table 22, for total group and the six occupational groups. Correlations between Factor I and Factor II were .60 for total group, and varied from .53 to .68 for the occupational groups. These correlations were higher than desired. However, the relatively high reliabilities obtained allow for considerable specific variance for each of the scales.

Correlations of the General Satisfaction scale with Factor I and Factor II scales were relatively high, since they represented part-



**Table 22. Intercorrelations of satisfaction scales, for total group and six occupational groups**

Occupational group	Scales		
	Factor I and Factor II	Factor I and General Satisfaction	Factor II and General Satisfaction
Total group	60	88	82
Janitors and maintenancemen	53	91	82
Assemblers	57	90	85
Machinists	53	90	84
Clerks	64	94	85
Salesmen	52	92	80
Engineers	68	80	79

Note—Decimal points omitted.

whole correlations. These correlations varied from .79 (with Factor II, for engineers) to .94 (with Factor I, for clerks).

### Occupational Differences

Research in job satisfaction has invariably found occupational differences in level and variability of expressed satisfaction. To determine whether the short form MSQ differentiated occupations in this manner, the six occupational groups were compared in terms of differences in level and variability on the three satisfaction scales.

**Level.** One-way analysis of variance was used to test the significance of differences in mean satisfaction scores among the six groups. Results are shown in Table 23.

**Table 23. Satisfaction scale means, for six occupational groups**

Occupational group	Scale		
	Factor I Intrinsic	Factor II Extrinsic	General Satisfaction
Janitors and maintenancemen	48.73	21.05	77.74
Assemblers	44.49	17.99	69.83
Machinists	48.14	19.61	75.45
Clerks	47.28	19.39	74.46
Salesmen	50.21	21.34	79.75
Engineers	48.42	21.29	77.73
F(5,1405)	7.87	12.59	10.97
p <sup>a</sup>	.001	.001	.001

<sup>a</sup> Probability of error in rejecting null hypothesis of no difference in group means, if  $p \leq .05$ .

Occupational differences in mean satisfaction scores were statistically significant beyond the .001 level for all three scales. On all three scales, the assembler group expressed the lowest satisfaction and salesmen the highest satisfaction. Next highest were engineers, and next lowest were clerks, also on all three scales.

**Variability.** Differences in variability of satisfaction scores among the six occupational groups were tested by means of Bartlett's test for homogeneity of variance. Table 24 shows that none of the differences in score variance among the occupational groups was statistically significant. Thus, the six groups differed in terms of level, but not variability, of expressed satisfaction.

**Table 24. Satisfaction scale variances, for six occupational groups**

Occupational group	Scale		
	Factor I Intrinsic	Factor II Extrinsic	General Satisfaction
Janitors and maintenancemen .....	51.19	23.17	132.53
Assemblers .....	50.49	25.11	127.69
Machinists .....	47.06	25.35	135.06
Clerks .....	58.36	24.42	153.65
Salesmen .....	55.68	21.93	133.56
Engineers .....	59.72	19.45	148.64
Chi-square <sup>a</sup> .....	5.55	7.18	2.78
p <sup>b</sup> .....			

<sup>a</sup> Chi-square value of Bartlett's test of homogeneity of variance, with 5 degrees of freedom.

<sup>b</sup> Probability of error in rejecting null hypothesis of no difference in group variances, if  $p \leq .05$ .

## Summary

A short form MSQ was developed, consisting of the 20 most representative items of the MSQ, one item from each scale. Administration time for this instrument is five minutes or less. Factor analysis of the 20-item correlation matrix yielded two relatively equal factors, labelled as intrinsic and extrinsic satisfaction. (These factors were almost identical to those obtained in a factor analysis of the 20-scale MSQ correlation matrix.) Integer factor scoring of the two factors yielded scores with adequate reliabilities for all occupational groups studied. Analyses of occupational group differences showed that the short-form MSQ differentiated among occupational groups, at least in terms of level of satisfaction. One major shortcoming of integer factor scoring for the two factor scales was

the relatively high intercorrelation between scales. However, this relative lack of scale independence was offset to some extent by the relatively high degree of scale reliability.

### Satisfactoriness

The objectives for the revision of the satisfactoriness instrument were similar to those for the satisfaction instrument, viz., to develop a questionnaire which was easy to administer and required only a short administration time. In addition, it was desired to improve the reliability of the satisfactoriness scales and to increase the number of dimensions of satisfactoriness measured.

### Scale Development

As a first step in revising the satisfactoriness questionnaire, item distributions for the original instrument were examined. It was found that, of the five points provided for rating on each item, only three were being used to any great extent. It was decided to limit the response alternatives to only three categories.

The next step involved writing a number of items which referred to different aspects of satisfactoriness not covered by the original set of items. A total of 59 items were written, using several different formats.<sup>12</sup> These items were divided into three forms with each form consisting of approximately two-thirds of the item pool. By an overlapping arrangement of items, it was possible to obtain the intercorrelation of each item with every other item, without requiring any single respondent to complete all 59 items.

Each of the three satisfactoriness forms was administered by mail to supervisors of employed individuals. This administration yielded a total of 597 completed forms.

Item distributions were obtained for each of the 59 items. These distributions were examined, and items were eliminated when 85% or more of the responses were found in one category. Twelve items were eliminated in this manner.

The remaining 47 items were intercorrelated. In forming this 47-item correlation matrix, correlations for the same pairs of items from two forms were averaged.

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<sup>12</sup> Copies of the items are in Appendix D, pp. 79-82.

The resulting correlation matrix was cluster analyzed, using the method described by Fruchter.<sup>43</sup> A minimum B-coefficient of 1.95 was used as the criterion for defining a cluster. This analysis yielded six clusters of three or more variables each, which comprised a total of 21 items. These 21 items, plus eight additional items which had the best item distributions but did not fall into any of the six clusters, comprised the final item set for the satisfactoriness questionnaire.<sup>44</sup>

The 29-item satisfactoriness questionnaire was administered by mail to the supervisors of the men participating in the present study. Completed questionnaires were received for 1,752 men. Sample sizes for the occupational groups are shown in Table 25. The largest groups were engineers (N = 398) and janitors and maintenancemen (N = 338). The smallest occupational group was assemblers (N = 114). Fifty-two men in the total sample were assigned to the miscellaneous category.

**Table 25. Sample sizes for satisfactoriness analyses**

Group	N
Janitors and maintenancemen	338
Assemblers	114
Machinists	314
Office clerks (includes general office clerks, accounting clerks, bookkeepers and business machine operators)	294
Salesmen (retail and wholesale)	242
Engineers (graduate professional engineers)	398
Miscellaneous	52
Total	1752

For ease of data processing, the satisfactoriness items were scored without regard for direction of favorableness. Items 1 through 28 were scored 1 through 3, going from left to right on the questionnaire, and item 29 was scored 1 through 4, going from top to bottom. Item means and standard deviations for the 29 satisfactoriness items are shown in Table 26. In examining these means, it should be noted that the high end of the scale is in the "favorable" direction for items 1 through 14, and item 29, and in the "unfavorable" direction for the remaining items (items 15 through 28).

<sup>43</sup> Fruchter, B. *Introduction to factor analysis*. Princeton: Van Nostrand, 1954. Ch. 2, pp. 12-17.

<sup>44</sup> A copy of the questionnaire is in Appendix D, pp. 83-84.

**Table 26. Satisfactoriness item means and standard deviations, for total group**

Item Number <sup>a</sup>	Mean	Standard Deviation
1.	2.30	.55
2.	2.36	.59
3.	2.25	.56
4.	2.20	.56
5.	2.44	.65
6.	2.15	.67
7.	2.38	.58
8.	2.25	.63
9.	2.36	.56
10.	2.22	.56
11.	2.26	.58
12.	2.17	.70
13.	2.40	.63
14.	2.22	.69
15.	1.70	.86
16.	2.10	.86
17.	2.08	.87
18.	1.44	.60
19.	1.69	.71
20.	1.75	.68
21.	1.49	.61
22.	1.42	.58
23.	1.73	.67
24.	1.54	.61
25.	1.57	.60
26.	1.64	.60
27.	1.58	.58
28.	1.58	.59
29.	1.71	.85

<sup>a</sup> See Appendix D for item content.

**Item Intercorrelations.** Table 27 shows the item intercorrelations for the 29 satisfactoriness items. Correlations ranged from .07 (item 10, "how well does he perform repetitive tasks?" with item 19 "how often does he become overexcited?") to .86 (item 17, "would you promote him to a position of more responsibility?" and item 16, "would you transfer him to a job at a higher level?"). Median correlation was .37.

**Factorial Composition.** The item correlation matrix was factor analyzed, using a principal factor solution and the Kaiser criterion for number of factors to extract. The resulting principal factor matrix was rotated to a varimax solution. The rotated factor matrix appears in Table 28. Three common factors were extracted, which accounted for about 45% of the total variance. Factor I is defined by loadings for items 5, 6, 12, 13, 14, 15, 16, 17, and 29; Factor II,

Table 27. Satisfactoriness item intercorrelations, for total group

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
1.																												
2.	53																											
3.	60	48																										
4.	30	25	33																									
5.	43	45	39	25																								
6.	38	44	36	23	48																							
7.	48	60	41	22	40	39																						
8.	44	46	42	25	46	45	48																					
9.	46	54	38	22	42	40	60	55																				
10.	31	25	35	73	26	22	23	24	26																			
11.	35	35	30	20	33	35	36	51	50	21																		
12.	33	40	33	20	50	64	32	44	34	18	33																	
13.	39	37	38	23	52	39	31	34	33	26	26	45																
14.	32	36	33	28	48	40	29	37	32	28	27	45	49															
15.	-36	-39	-35	-17	-46	-41	-33	-37	-30	-20	-30	-44	-42	-45														
16.	-34	-36	-34	-18	-46	-46	-30	-39	-34	-19	-35	-49	-41	-43	59													
17.	-35	-37	-33	-17	-48	-45	-31	-40	-35	-19	-35	-47	-40	-43	60	80												
18.	-27	-20	-27	-17	-25	-11	-25	-19	-24	-19	-16	-09	-20	-21	16	14	14											
19.	-21	-26	-21	-10	-19	-29	-23	-23	-28	-07	-30	-24	-19	-13	20	25	25	14										
20.	-29	-33	-24	-15	-29	-37	-30	-35	-40	-16	-40	-30	-23	-24	27	28	30	22	62									
21.	-48	-46	-42	-23	-47	-38	-44	-44	-48	-25	-36	-32	-40	-36	38	37	36	39	31	44								
22.	-29	-24	-26	-16	-30	-18	-26	-26	-28	-19	-16	-21	-24	-28	26	23	24	50	18	28	42							
23.	-29	-30	-27	-18	-31	-33	-27	-33	-36	-18	-36	-31	-26	-28	25	28	29	25	50	62	41	34						
24.	-25	-25	-23	-14	-28	-25	-26	-27	-30	-16	-28	-26	-25	-25	26	28	28	26	33	38	39	44	46					
25.	-33	-33	-31	-14	-30	-33	-30	-35	-37	-16	-33	-30	-30	-26	28	33	34	27	38	41	48	33	46	45				
26.	-26	-29	-25	-18	-32	-29	-25	-31	-30	-21	-29	-32	-31	-39	29	33	34	25	25	35	37	38	40	51	43			
27.	-37	-39	-33	-21	-39	-38	-36	-38	-39	-22	-32	-36	-34	-33	32	36	36	26	28	38	47	31	38	34	50	46		
28.	-30	-32	-31	-16	-35	-37	-29	-32	-33	-17	-29	-36	-34	-33	29	36	36	22	35	35	42	28	41	38	55	43	60	
29.	-43	-43	-39	-25	-60	-53	-36	-46	-40	-27	-34	-55	-57	-56	58	55	55	23	26	35	50	31	33	32	39	37	42	39

Note—Decimal points omitted.

**Table 28. Varimax factor matrix of satisfactoriness items, for total group**

Item	Factor			Communality	SMC <sup>a</sup>
	I	II	III		
1.	-33	27	54	47	50
2.	-39	29	47	46	51
3.	-32	23	52	43	45
4.	-09	03	65	43	55
5.	-56	24	36	50	51
6.	-57	27	24	46	52
7.	-30	31	48	41	50
8.	-42	32	40	44	48
9.	-31	40	44	46	54
10.	-10	04	66	45	56
11.	-31	38	27	31	39
12.	-64	22	18	48	53
13.	-51	20	31	40	43
14.	-53	19	29	40	44
15.	65	-18	-17	48	48
16.	81	-20	-04	69	76
17.	80	-21	-04	69	76
18.	02	-36	-30	22	32
19.	14	-60	00	38	44
20.	18	-68	-10	51	56
21.	31	-52	-38	51	51
22.	12	-46	-25	29	41
23.	17	-68	-12	50	50
24.	17	-60	-11	40	42
25.	24	-63	-14	47	47
26.	27	-52	-15	37	42
27.	32	-52	-24	43	48
28.	32	-55	-13	42	49
29.	67	-28	-28	60	61
Contribution of factor	5.14	4.65	3.26	13.05	
Proportion of common variance	.39	.36	.25	1.00	

Note—Decimal points omitted.

<sup>a</sup> Estimated communalities: squared multiple correlation coefficients.

by items 19 through 28; and Factor III, by items 1 through 4, 7, 9, and 10. Factor I appears to be a "promotability/competence" factor, because of the high loadings for items 16, 17, 29 and 15. Factor II seems to be a "personal adjustment" factor relating to the supervisor's description of unusual personality characteristics of the employee which have implications for mental health. Factor III appears to imply "conformance" on the part of the employee, reflecting the individual's capacity to accept limitations imposed by the work environment. Thus, Factors I and III appear to be

similar to the "performance" and "conformance" factors found in the earlier Work Adjustment Project studies on satisfactoriness, while Factor II represents a new satisfactoriness factor.

**Factor Scores.** Since internal consistency reliabilities were found to differ for the exact factor scores and integer factor scores developed for the satisfaction factors, both types of scores were also developed for the three satisfactoriness factors. Exact factor scores were computed, using the regression solution, as in the satisfaction analyses. However, integer factor scores were developed differently for the satisfactoriness factors than for satisfaction. The Method of Reciprocal Averages<sup>45</sup> was used to re-weight item response alternatives based on the response distributions. Integer weights from 1 to 9 were used. Integer factor scores were based on the fol-

**Table 29. Means, standard deviations and Hoyt reliability coefficients of satisfactoriness exact factor scores and integer factor scores, for total group**

	Mean	Standard Deviation	Hoyt Reliability Coefficient
<b>Exact factor scores</b>			
Factor 1	.25	.77	.69
Factor 2	-2.68	.56	.67
Factor 3	4.34	.51	.48
<b>Integer factor scores</b>			
Factor I	37.18	17.53	.89
Factor II	41.47	19.98	.88
Factor III	43.46	10.89	.83
General satisfactoriness	103.23	39.26	.94

lowing items: for Factor I, items 5, 6, 12, 13, 14, 15, 16, 17 and 29; for Factor II, items 19, 20, 21, 22, 23, 24, 25, 26, 27, 28; and for Factor III, items 1, 2, 3, 4, 7, 9 and 10. In addition, a "general satisfactoriness" score based on all 29 satisfactoriness items was developed, using the reciprocal averages method.<sup>46</sup> Reliability coefficients for the exact factor scores and the integer factor scores are shown in Table 29.

<sup>45</sup> Hoyt, C. J., Collier, R. O. The mathematical basis of reciprocal averages. (Paper read at meeting of Psychometric Society, Cleveland, Ohio, 1953).

<sup>46</sup> Because of limitations in the computer program for the method of reciprocal averages, a stratified random sample of 800 individuals was used for the "general satisfactoriness" scale. This sample represented each occupational group according to its proportion in the total sample. For the three factor scores, the total sample of 1752 was used in scale development.



As Table 29 shows, reliability coefficients for the integer factor scores were consistently much higher than those for the exact factor scores. As a result, integer factor scores were used for all further analyses.

To determine whether the scale scores (i.e., the integer factor scores) were reliable for all occupational groups, Hoyt reliability coefficients were computed separately for each of the five occupational groups.<sup>47</sup> These coefficients are shown in Table 30. For all groups, the lowest reliability coefficients were obtained on Factor III, the "conformance" scale. This scale also had the largest between-group variability in reliability coefficients. For Factor III, reliabilities varied from .74 for janitors and maintenancemen, to .86 for engineers and clerks. The "general satisfactoriness" scale and Factor I ("promotability-competence") yielded reliability coefficients which differed little among the occupational groups. For Factor II ("personal adjustment") reliabilities varied from .84 (for salesmen) to .90 (for assemblers and machinists).

**Table 30. Satisfactoriness scale reliabilities, for five occupational groups**

Occupational Group	Scale			
	Factor I	Factor II	Factor III	General Satisfactoriness
Janitors and maintenancemen	.89	.87	.74	.92
Assemblers and machinists	.89	.90	.84	.94
Clerks	.91	.87	.86	.94
Salesmen	.88	.84	.83	.93
Engineers	.88	.89	.86	.94

Intercorrelations among the satisfactoriness scales for the total group and the occupational groups are shown in Table 31. Moderate correlations were found among the three factor scales, two-thirds of the coefficients ranging between .55 and .65. The largest variability was observed for correlations between Factor I ("promotability-competence") and Factor III ("conformance") ranging from  $-.70$  for assemblers and machinists, to  $-.39$  for engineers. Part-whole correlation accounted for the high (generally above .80) coefficients found between the factor scales and the general satisfactoriness scale. Slight, if any, differences in the correlations were observed

<sup>47</sup> Since subsequent analysis revealed no significant differences between assemblers and machinists, these groups were combined for the satisfactoriness analyses.

**Table 31. Intercorrelations of satisfactoriness scales, for total group and six occupational groups**

Scales	Occupational Group						
	Total Group	Janitors and Maintenance-men	Assemblers	Machinists	Clerks	Salesmen	Engineers
Factor I and Factor II .....	57	66	58	55	58	55	54
Factor I and Factor III .....	-58	-68	-70	-64	-63	-63	-39
Factor II and Factor III .....	-56	-60	-46	-55	-63	-57	-49
Factor I and General Satisfactoriness .....	86	89	90	86	87	86	84
Factor II and General Satisfactoriness .....	84	88	81	84	86	83	83
Factor III and General Satisfactoriness .....	-79	-84	-81	-82	-85	-83	-66

Note—Decimal points omitted.

among the occupational groups, most noteworthy being the fact that the lowest correlations were generally found for the engineer group.

### Occupational Group Differences

Occupational group differences in satisfactoriness do not have the same implications for vocational psychology that differences in needs, abilities or satisfaction do. While it is possible to say that one occupational group expresses more satisfaction than another, or that one group has a higher need for achievement or has more numerical ability than another, it is not ordinarily meaningful to say that one occupational group is "more satisfactory" than another. This is so because the direct source of such group differences is not only the employees themselves, but includes the supervisors who complete the ratings on the employees. This is, a significant mean difference in satisfactoriness scores may reflect not only a "true" difference in satisfactoriness between two groups, but also a tendency among the supervisors of one group to rate their employees higher, when compared with the supervisors of the other group.

However, data on group differences in satisfactoriness are especially significant in evaluating the work adjustment of individuals who have moved from one occupational group to another. If there

are significant occupational differences in satisfactoriness scores, the evaluation of work adjustment outcomes should be made in the light of differing occupational norms for the different occupations. It was primarily for the purpose of developing differential occupational norms for the satisfactoriness scales that the analysis of occupational group differences was done.

**Level.** One-way analysis of variance was used to compare mean satisfactoriness scores for the five occupational groups. Table 32 shows the results of this comparison. Occupational group differences were statistically significant for three of the four satisfactoriness scales. On Factor I ("promotability-competence") janitors and maintenancemen were rated highest of the five groups by their supervisors, and

**Table 32. Satisfactoriness scale means, for total group and five occupational groups**

Occupational Group	Scale			
	Factor I	Factor II	Factor III	General Satisfactoriness
Total group <sup>a</sup>	37.18	41.47	43.46	103.23
Janitors and maintenancemen	40.27	41.99	42.96	107.95
Assemblers and machinists	39.82	42.75	42.36	107.28
Clerks	33.30	39.22	46.17	94.77
Salesmen	37.10	40.77	44.00	101.75
Engineers	34.49	42.12	42.40	102.40
F(4,1695)	11.43	1.53	6.78	5.95
p <sup>b</sup>	.001		.001	.001

<sup>a</sup> Includes 52 individuals whose jobs were not classifiable into the five occupational groups.

<sup>b</sup> Probability of error in rejecting null hypothesis of no difference between group means, if  $p \leq .05$ .

clerks were rated lowest. On Factor III ("conformance", which was negatively correlated with Factor I), clerks were rated highest and assemblers and machinists lowest (closely followed by engineers). On the "general satisfactoriness" scale, clerks were rated least favorably by their supervisors, while janitors and maintenancemen, and assemblers and machinists, had the highest mean scores. Group differences were not statistically significant for Factor II ("personal adjustment").

**Variability.** Differences in variance among the five occupational groups were tested by means of Bartlett's test of homogeneity of variance. Table 33 shows that observed differences were significant only for Factor III ("conformance"). On this scale, engineers were

**Table 33. Satisfactoriness scale variances, for total group and five occupational groups**

Occupational Group	Scale			
	Factor I	Factor II	Factor III	General Satisfactoriness
Total group <sup>a</sup>	307.31	399.06	118.50	1541.60
Janitors and maintenancemen	289.96	421.52	138.07	1709.40
Assemblers and machinists	310.75	438.50	118.72	1619.01
Clerks	314.15	379.26	129.55	1554.14
Salesmen	281.96	348.59	118.78	1434.93
Engineers	300.87	380.06	89.29	1317.68
Chi-square <sup>b</sup>	1.22	5.41	19.77	7.58
p <sup>c</sup>			.001	

<sup>a</sup> Includes 52 individuals whose jobs were not classifiable into the five occupational groups.

<sup>b</sup> Chi-square value of Bartlett's test of homogeneity of variance, with 4 degrees of freedom.

<sup>c</sup> Probability of error in rejecting null hypothesis of no difference between group variances, if  $p \leq .05$ .

rated most uniformly (received the least rating variability) and janitors and maintenancemen obtained the most variable ratings.

## Summary

A new satisfactoriness questionnaire was developed, based on an earlier instrument. Results with the revised satisfactoriness measure indicate that, in large part, the objectives set for its development were attained. The 29-item questionnaire is easily administered and may be completed in five minutes or less. The alternation ranking item of the earlier satisfactoriness instrument, which became cumbersome with groups of 15 or more employees, has been eliminated. The questionnaire takes up no more space than a single sheet. The number of scales for the measurement of satisfactoriness has been increased from two to four, and includes a "general satisfactoriness" scale. The new scales have manifested high internal consistency reliability which has remained high for diverse occupational groups.

The major limitation of the new instrument is the relatively high correlations obtaining between the factor-analytically-derived scales. These correlations varied only slightly for the various occupational groups. However, taken in relation to the high scale reliabilities, sufficient reliable and specific variance is available to warrant considering these scales as relatively unique.

Finally, analysis of the satisfactoriness scales has indicated that separate occupational norms are necessary for at least three of the four scales.

## Criterion Variable Relationships

The *Theory of Work Adjustment* conceptualizes satisfaction and satisfactoriness as independent sets of variables. No correlational relationship between measured satisfaction and measured satisfactoriness is anticipated. Previous Work Adjustment Project research, using earlier satisfaction and satisfactoriness instruments, has supported this view.<sup>48</sup> With the development of new instruments for measuring satisfaction and satisfactoriness, it was felt necessary to determine whether this postulated absence of correlational relationship held true for the new instruments.

### Satisfaction-Satisfactoriness Cross-correlations

Cross-correlations between the four satisfactoriness scales and the three satisfaction scales, for the total group, are shown in Table 34. The highest correlation in the table is  $-.13$ , between "general

**Table 34. Cross-correlations between satisfaction and satisfactoriness scales, for total group**

Satisfactoriness	Satisfaction		
	Factor I	Factor II	General
Factor I	-.09	-.12	-.10
Factor II	-.03	-.09	-.08
Factor III	.05	.07	.10
General	-.09	-.13	-.11

Note—Decimal points omitted.

satisfactoriness" and Factor II ("extrinsic") satisfaction. The lowest correlation is  $-.03$ , between Factor II ("personal adjustment") satisfactoriness and Factor I ("intrinsic") satisfaction. The correlation between "general satisfaction" and "general satisfactoriness" is  $-.11$ . These results suggest that a maximum of less than 2% of the variance is common between any pair of scales, taking one from each instrument.

To determine whether the satisfaction-satisfactoriness relationship differed among occupational groups, the four satisfactoriness scales and the three satisfaction scales were cross-correlated separately for each of the six occupational groups. These results are

<sup>48</sup> *Minnesota studies in vocational rehabilitation*, XIV, pp. 31-40. op. cit.

shown in Table 35. It is clear from Table 35 that, regardless of occupational group, the correlation between any satisfaction scale and any satisfactoriness scale is generally low, the highest correlation being  $-.22$  (Factor I satisfaction vs. Factor I satisfactoriness, for machinists). Differences among occupational groups were very slight. Mean cross-correlation ranged from  $.04$ , for salesmen, to  $.15$  for clerks.

**Table 35. Cross-correlations between satisfaction and satisfactoriness scales, for six occupational groups**

Satisfaction Scale	Satisfactoriness			
	Factor I	Factor II	Factor III	General
<b>Janitors and maintenancemen</b>				
I <sup>a</sup> .....	-.06	-.05	.10	-.08
II .....	-.08	-.11	.11	-.12
G .....	-.08	-.09	.12	-.12
<b>Assemblers</b>				
I .....	-.05	.21	.00	.05
II .....	-.06	.03	-.02	-.02
G .....	-.07	.13	-.01	.02
<b>Machinists</b>				
I .....	-.22	-.03	.10	-.15
II .....	-.13	-.08	.16	-.16
G .....	-.19	-.05	.14	-.16
<b>Clerks</b>				
I .....	-.09	-.12	.16	-.15
II .....	-.14	-.15	.13	-.18
G .....	-.13	-.15	.17	-.19
<b>Salesmen</b>				
I .....	.03	-.01	-.01	.01
II .....	-.03	-.09	.07	-.08
G .....	.01	-.06	.02	-.03
<b>Engineers</b>				
I .....	-.11	-.04	-.03	-.12
II .....	-.20	-.12	.02	-.19
G .....	-.12	-.12	.10	-.11

Note—Decimal points omitted.

<sup>a</sup> I = Factor I; II = Factor II; G = General Satisfaction Scale.

## Canonical Correlation Analysis

Maximum canonical correlations were computed between the factor-analytically-derived satisfaction and satisfactoriness scales, for the total group and separately for each of the six occupational groups. (The "general" scales were not included in this analysis.) Table 36 shows the results of this analysis.

**Table 36. Maximum canonical correlation of satisfaction and satisfactoriness scales, and normal regression coefficients for the prediction of canonical variates, for total group and six occupational groups**

Coefficient	Occupational Group						
	Total Group (N = 1177)	Janitors and Maintenancemen (N = 209)	Assemblers (N = 68)	Machinists (N = 199)	Clerks (N = 186)	Salesmen (N = 165)	Engineers (N = 317)
Maximum canonical correlation	12	13	31	24	17	11	20
Regression coefficients:							
Satisfaction scales							
Factor I	23	36	95	98	54	38	29
Factor II	97	93	-30	-19	84	-92	-96
Satisfactoriness scales							
Factor I	-92	08	-57	-91	-29	-35	92
Factor II	-32	-49	82	39	-63	72	28
Factor III	24	87	-01	-13	72	-60	26

Note—Decimal points omitted.

For the total group, the maximum canonical correlation between the satisfaction and satisfactoriness scales was .12, indicating that about 1.5% of the variance is common to the two sets of scales. The regression coefficients indicate that the major contributions to this relationship come from Factor II ("extrinsic") satisfaction, and Factor I "promotability-competence" satisfactoriness.

Results of the canonical correlation analysis for the six occupational groups indicate that the common variance between the two sets of scales ranges from 1% for the salesmen group, to about 10% for the assemblers. Regression coefficients for the canonical variates also differed from group to group. For janitors and maintenancemen, and clerks, the largest regression coefficients were for Factor II ("extrinsic") satisfaction and Factor III ("conformance") satisfactoriness. For the assemblers, the largest regression coefficients were for Factor I ("intrinsic") satisfaction and Factor II ("personal adjustment") satisfactoriness. For machinists, Factor I of both variable sets ("intrinsic" satisfaction and "promotability-competence" satisfactoriness) had the largest regression coefficients. For both the engineers and the salesmen, Factor II ("extrinsic") satisfac-

tion had the largest coefficients, but Factor II ("personal adjustment") satisfactoriness had the largest coefficient for the salesmen. while it was Factor I ("promotability-competence") satisfactoriness for the engineers. Thus, while relationships between the two sets of variables were of the same low magnitude for the several occupational groups, the regression coefficients for the canonical variates differed from group to group.

### Summary

These results generally support the position taken in the *Theory of Work Adjustment*, that satisfaction and satisfactoriness are to be considered as two independent sets of variables. On a scale-by-scale basis, little or no relationship was found between measured satisfaction and measured satisfactoriness. A maximum of only about 5% of the variance was common between any satisfaction scale paired with any satisfactoriness scale. Considering the relationship between the two sets of variables, similar results were obtained. For the total group, the relationship between sets of satisfaction and satisfactoriness variables could be expressed in only 2% common variance. For the separate occupational groups, the maximum amount of common variance obtained between the two sets of variables was 10%. However, occupational differences were observed in the patterns of regression coefficients for the canonical variates. These results confirm earlier Work Adjustment Project findings concerning the relative independence of measured satisfaction and measured satisfactoriness.



## APPENDIXES

Table A-1. Cross-correlations between MIQ scales and ability tests, for janitors and maintenancemen (N = 231)

MIQ Scale	Ability Test								
	Clerical	Computational	Spatial	Verbal	Discriminative	Arithmetic	Perceptual	Sensorimotor	Mechanical Knowledge
1. Ability utilization	28	30	32	33	28	34	27	14	31
2. Achievement	24	24	30	32	18	21	22	08	20
3. Activity	-20	-14	-11	-20	-07	-18	-16	-17	-08
4. Advancement	22	23	20	15	23	23	25	24	20
5. Authority	-14	-16	-12	-29	-07	-11	-11	00	-03
6. Company policies and practices	13	27	17	23	07	31	12	13	09
7. Compensation	04	06	03	11	03	05	05	01	04
8. Co-workers	02	06	-04	06	02	04	-04	-04	-06
9. Creativity	01	04	09	05	08	06	-01	01	13
10. Independence	-15	-20	-15	-20	-16	-21	-21	-19	-12
11. Moral values	04	06	04	11	-02	09	05	02	00
12. Recognition	-01	-05	-01	-03	01	-05	-01	-06	02
13. Responsibility	01	02	12	05	14	05	06	01	12
14. Security	16	15	08	19	15	11	15	07	06
15. Social service	03	03	-07	00	01	02	-05	-06	-12
16. Social status	-23	-29	-21	-29	-16	-24	-17	-10	-28
17. Supervision—human relations	05	13	10	12	03	10	08	-08	09
18. Supervision—technical	-01	04	-01	-04	-05	05	-04	-07	05
19. Variety	-07	-16	02	-06	-10	-15	-08	-04	-04
20. Working conditions	06	20	16	13	11	10	07	06	00

Note—Decimal points omitted.

Table A-2. Cross-correlations between MIQ scales and ability tests, for assemblers and machinists (N = 315)

MIQ Scale	Ability Test								
	Clerical	Computational	Spatial	Verbal	Discriminative	Arithmetic	Perceptual	Sensorimotor	Mechanical Knowledge
1. Ability utilization .....	15	22	17	21	15	16	24	10	10
2. Achievement .....	17	24	16	24	19	22	26	17	09
3. Activity .....	-05	-12	-09	-13	-07	-13	-05	-06	04
4. Advancement .....	11	18	12	16	16	15	12	21	-04
5. Authority .....	05	01	-11	-08	00	-01	-04	03	-10
6. Company policies and practices .....	01	07	02	12	00	06	01	02	03
7. Compensation .....	05	03	04	12	04	-04	05	-03	05
8. Co-workers .....	08	-02	-01	04	04	-04	01	01	-02
9. Creativity .....	08	12	09	11	09	15	09	10	07
10. Independence .....	-04	-12	-20	-19	-11	-15	-13	-09	-09
11. Moral values .....	08	02	04	16	10	12	01	04	06
12. Recognition .....	-04	04	-03	-07	-04	01	-04	07	-06
13. Responsibility .....	05	08	03	06	07	09	06	08	03
14. Security .....	04	05	-01	06	05	-01	03	06	03
15. Social service .....	-02	-03	-15	-02	-05	-03	-03	00	-08
16. Social status .....	00	-07	-16	-16	-06	-07	-05	07	-32
17. Supervision— human relations .....	-05	-01	00	02	00	-02	06	-04	02
18. Supervision—technical .....	-06	-04	01	-08	-04	-09	-02	-14	-03
19. Variety .....	11	04	-03	05	03	01	07	06	-05
20. Working conditions .....	06	08	07	09	07	08	10	02	09

Note—Decimal points omitted.

Table A-3. Cross-correlations between MIQ scales and ability tests, for clerks (N = 221)

MIQ Scale	Ability Test								
	Clerical	Computational	Spatial	Verbal	Discriminative	Arithmetic	Perceptual	Sensorimotor	Mechanical Knowledge
1. Ability utilization	12	17	-07	-07	19	-10	15	-13	-04
2. Achievement	-07	-02	-21	-21	06	-24	09	-26	03
3. Activity	21	-04	35	37	-01	41	-04	42	-11
4. Advancement	-03	15	-21	-20	13	-20	01	-21	09
5. Authority	-14	-12	-07	-07	-04	-04	-11	-04	03
6. Company policies and practices	20	10	20	35	-10	34	-08	35	-09
7. Compensation	-10	-04	-12	-08	-07	-11	-03	-12	03
8. Co-workers	-10	-07	00	-11	-02	-03	-02	-08	-05
9. Creativity	24	11	27	22	08	22	08	22	06
10. Independence	-19	-24	-13	-10	-08	-07	-09	-06	-08
11. Moral values	-01	02	01	02	04	-03	06	-01	-01
12. Recognition	41	19	59	76	-16	79	-20	76	-08
13. Responsibility	02	12	-09	-11	18	-14	15	-13	11
14. Security	-04	-10	-07	-10	03	-10	00	-09	01
15. Social service	-04	-14	-09	-14	02	-14	01	-13	-12
16. Social status	-07	-06	-07	-04	-09	-05	-16	-08	03
17. Supervision—human relations	-11	06	-17	-15	-02	-15	03	-14	-01
18. Supervision—technical	-04	07	-12	-13	04	-13	08	-12	02
19. Variety	-09	-15	-02	-11	01	-10	08	-09	06
20. Working conditions	-23	-21	-21	-18	-14	-18	-06	-17	08

Note- Decimal points omitted.

Table A-4. Cross-correlations between MIQ scales and ability tests, for salesmen (N = 199)

MIQ Scale	Ability Test								
	Clerical	Computational	Spatial	Verbal	Discriminative	Arithmetic	Perceptual	Sensorimotor	Mechanical Knowledge
1. Ability utilization .....	15	03	10	25	09	02	10	11	12
2. Achievement .....	01	-08	00	16	-09	-09	-11	06	03
3. Activity .....	-18	-14	-17	-17	-13	-16	-09	-13	01
4. Advancement .....	15	08	16	17	12	12	10	15	-02
5. Authority .....	18	09	04	03	03	13	07	17	-05
6. Company policies and practices .....	-05	08	07	11	10	05	07	04	02
7. Compensation .....	-05	-02	-04	-03	-04	01	-12	-15	-07
8. Co-workers .....	-05	-04	00	-12	02	-05	-08	-15	-05
9. Creativity .....	11	07	06	04	11	09	11	09	04
10. Independence .....	-12	-11	-25	-19	-19	-03	-11	-12	-10
11. Moral values .....	-01	15	23	14	14	10	12	08	16
12. Recognition .....	10	00	00	11	04	01	00	00	-01
13. Responsibility .....	18	20	10	07	16	28	16	14	05
14. Security .....	-13	-09	-13	-19	-17	-09	-14	-16	00
15. Social service .....	-02	-11	-05	-13	-04	-09	-10	-04	01
16. Social status .....	04	04	-05	07	01	-01	00	04	-18
17. Supervision— human relations .....	04	08	02	16	09	12	06	14	-03
18. Supervision—technical .....	02	-03	01	05	03	-01	04	14	05
19. Variety .....	-04	-06	-17	-08	-09	-03	-09	-09	-13
20. Working conditions .....	-03	-05	-07	-12	-10	-02	-03	-21	-06

Note—Decimal points omitted.

Table A-5. Cross-correlations between MIQ scales and ability tests, for engineers (N = 379)

MIQ Scale	Ability Test								
	Clerical	Computa- tional	Spatial	Verbal	Discrim- inative	Arith- metic	Percep- tual	Sensori- motor	Mechanical Knowledge
1. Ability utilization .....	-.02	-.05	.02	-.05	-.04	-.05	.02	-.03	.06
2. Achievement .....	.03	-.01	.00	.05	.01	-.02	.00	.00	.01
3. Activity .....	-.01	-.02	.04	-.06	-.05	-.09	.03	.04	.08
4. Advancement .....	.05	.01	.08	.04	.05	.03	.06	.00	.07
5. Authority .....	-.02	-.03	.06	-.07	.04	-.06	.02	.07	-.06
6. Company policies and practices .....	-.07	-.04	-.07	-.01	-.06	-.01	-.07	-.05	.03
7. Compensation .....	.02	.16	-.02	.09	.03	.15	.08	-.01	-.09
8. Co-workers .....	.02	.10	.04	.06	.10	.09	.05	.00	-.07
9. Creativity .....	-.05	-.08	.11	.01	-.04	-.04	.04	.06	.10
10. Independence .....	-.01	.01	.01	-.07	-.03	.00	.02	-.06	-.01
11. Moral values .....	.08	.03	.05	.23	.05	.16	.03	.02	.01
12. Recognition .....	.06	-.04	.01	-.02	.02	-.02	.04	.08	.00
13. Responsibility .....	.06	.01	.08	.08	.03	.01	.07	.02	.05
14. Security .....	-.06	.01	-.10	-.03	-.10	.00	-.10	-.05	-.08
15. Social service .....	-.02	-.03	.00	-.06	.02	-.01	-.04	-.06	.01
16. Social status .....	-.01	-.09	-.04	-.07	-.05	-.05	-.09	.04	-.11
17. Supervision— human relations .....	-.03	.00	.04	-.02	.06	.00	.03	.06	.07
18. Supervision—technical .....	-.02	-.01	-.06	-.03	.02	-.02	-.08	.00	.01
19. Variety .....	.00	-.04	.02	-.01	-.03	-.12	.03	.01	.07
20. Working conditions .....	-.07	.02	-.09	.01	-.07	.00	-.05	-.10	-.09

Note—Decimal points omitted.

## Appendix B

### MINNESOTA IMPORTANCE QUESTIONNAIRE

#### Directions

The purpose of this questionnaire is to find out what you consider *important in your ideal job*, the kind of job you would most like to have.

On the following pages you will find *pairs* of statements about work.

- Read each *pair* of statements carefully.
- Decide which statement of the *pair* is *more* important to you in your *ideal* job.
- For each pair mark your choice on the answer sheet. *Do not mark this booklet.* (See next page for directions on how to mark the answer sheet.)

Do this for *all* pairs of statements. Work as rapidly as you can.

Read each pair of statements, mark your choice, then move on to the next pair. Be sure to make a choice for *every* pair. *Do not* go back to change your answers to any pairs.

Remember: You are to decide which statement of the pair is *more* important to *you* in your *ideal* job.

Mark your choice on the answer sheet, *not* on this booklet.

Ask yourself: Which is *more* important to me in my *ideal* job?

- a. I could do something that makes use of my abilities.
1. OR
- b. The job could give me a feeling of accomplishment.
- a. The job could give me a feeling of accomplishment.
2. OR
- b. I could be busy all the time.
- a. I could be busy all the time.
3. OR
- b. The job would provide an opportunity for advancement.
- a. The job would provide an opportunity for advancement.
4. OR
- b. I could tell people what to do.
- a. I could tell people what to do.
5. OR
- b. The company would administer its policies fairly.
- a. The company would administer its policies fairly.
6. OR
- b. My pay would compare well with that of other workers.
- a. My pay would compare well with that of other workers.
7. OR
- b. My co-workers would be easy to make friends with.
- a. My co-workers would be easy to make friends with.
8. OR
- b. I could try out some of my own ideas.
- a. I could try out some of my own ideas.
9. OR
- b. I could work alone on the job.
- a. I could work alone on the job.
10. OR
- b. I could do the work without feeling that it is morally wrong.
- a. I could do the work without feeling that it is morally wrong.
11. OR
- b. I could get recognition for the work I do.
- a. I could get recognition for the work I do.
12. OR
- b. I could make decisions on my own.
- a. I could make decisions on my own.
13. OR
- b. The job would provide for steady employment.
- a. The job would provide for steady employment.
14. OR
- b. I could do things for other people.



Ask yourself: Which is *more* important to me in my *ideal* job?

- a. I could do things for other people.
15. OR
- b. I could be "somebody" in the community.
- a. I could be "somebody" in the community.
16. OR
- b. My boss would back up his men (with top management).
- a. My boss would back up his men (with top management).
17. OR
- b. My boss would train his men well.
- a. My boss would train his men well.
18. OR
- b. I could do something different every day.
- a. I could do something different every day.
19. OR
- b. The job would have good working conditions.
- a. My boss would train his men well.
20. OR
- b. The job would have good working conditions.
- a. My boss would back up his men (with top management).
21. OR
- b. I could do something different every day.
- a. I could be "somebody" in the community.
22. OR
- b. My boss would train his men well.
- a. I could do things for other people.
23. OR
- b. My boss would back up his men (with top management).
- a. The job would provide for steady employment.
24. OR
- b. I could be "somebody" in the community.
- a. I could make decisions on my own.
25. OR
- b. I could do things for other people.
- a. I could get recognition for the work I do.
26. OR
- b. The job would provide for steady employment.
- a. I could do the work without feeling that it is morally wrong.
27. OR
- b. I could make decisions on my own.

## Appendix C

### MINNESOTA SATISFACTION QUESTIONNAIRE

The purpose of this questionnaire is to give you a chance to tell *how you feel about your present job*, what things you are *satisfied* with and what things you are *not satisfied* with.

On the basis of your answers and those of thousands of other people throughout the nation, we hope to get a better understanding of the things people *like and dislike about their jobs*.

On the back of this sheet you will find statements about your *present* job.

—Read each statement carefully.

—Decide *how satisfied you feel about the aspect of your job* described by the statement.

Keeping the statement in mind:

—if you feel that your job gives you *more than you expected*, check the box under “VS” (Very Satisfied);

—if you feel that your job gives you *what you expected*, check the box under “S” (Satisfied);

—if you *cannot make up your mind* whether or not the job gives you what you expected, check the box under “N” (Neither Satisfied nor Dissatisfied);

—if you feel that your job gives you *less than you expected*, check the box under “DS” (Dissatisfied);

—if you feel that your job gives you *much less than you expected*, check the box under “VDS” (Very Dissatisfied).

Remember: Keep the statement in mind when deciding *how satisfied you feel about that aspect of your job*.

Do this for *all* statements. Please answer *every* item.

*Be frank and honest.* Give a true picture of your feelings about your *present* job.

Ask yourself: How satisfied am I with this aspect of my job?

VS means I am very satisfied with this aspect of my job.

S means I am satisfied with this aspect of my job.

N means I can't decide whether I am satisfied or not with this aspect of my job.

DS means I am dissatisfied with this aspect of my job.

VDS means I am very dissatisfied with this aspect of my job.

On my present job, this is how I feel about:	VDS	DS	N	S	VS
1. Being able to keep busy all the time .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. The chance to work alone on the job .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. The chance to do different things from time to time .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. The chance to be "somebody" in the community .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. The way my boss handles his men .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. The competence of my supervisor in making decisions .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Being able to do things that don't go against my conscience .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. The way my job provides for steady employment .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. The chance to do things for other people .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. The chance to tell people what to do .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. The chance to do something that makes use of my abilities .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. The way company policies are put into practice .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. My pay and the amount of work I do .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. The chances for advancement on this job .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. The freedom to use my own judgment .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. The chance to try my own methods of doing the job .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. The working conditions .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. The way my co-workers get along with each other .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. The praise I get for doing a good job .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. The feeling of accomplishment I get from the job .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Appendix D

### FIFTY-NINE SATISFACTORINESS ITEMS

Please check the best answer for each question

Be sure to answer *all* questions

Does he (she) . . .	yes	not sure	no
1. do his job accurately and carefully?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. get along well with his co-workers?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. follow company rules and procedures?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. work fast? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. get along well with his supervisor?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. stay with a job until it is finished?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. accept the authority of his superiors?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. do work that is rough and sloppy?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. work well as a member of a work team?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. seem willing to do what his supervisor wants?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. need to be reminded to do routine tasks?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. perform his work at about the same pace most of the time?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. accept the responsibility of his job?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. keep his equipment in good repair?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. have ups and downs in his level of performance?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. work well with tools and equipment?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Can he (she) . . .	yes	not sure	no
17. speed up under pressure?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. perform repetitive or monotonous tasks?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. organize and plan his own work?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. perform tasks requiring variety and change in methods? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please check the best answer for each question

Be sure to answer *all* questions

Compared to others in his (her) work group, how often does he (she) . . .	less	about the same	more
21. come late for work?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. become overexcited? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. become upset and unhappy?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. need disciplinary action?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. daydream on the job?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. stay absent from work?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. seem bothered by something?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. have accidents at work?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. complain about physical ailments?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. say "odd" things?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. seem to tire easily?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. act as if he is not listening when spoken to.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. wander from subject to subject when talking?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	not as good	about the same	better
Compared to others in his (her) work group . . .			
34. how good is the quality of his work?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. how good is the quantity of his work?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	yes	not sure	no
If you could make the decision, would you . . .			
36. give him (her) a pay raise?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. transfer him (her) to a job at a lower level?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. transfer him (her) to a job at a higher level?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please check the best answer for each question

Be sure to answer *all* questions

Compared to others in his (her) work group, how well does he (she) . . .	not as well	about the same	better
39. follow company policies and practices?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. accept the direction of his supervisor?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. perform tasks requiring attention to detail?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. make use of his equipment and tools?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. follow standard work rules and procedures?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. organize and develop his own work procedures?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. perform tasks requiring repetitive movements?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. accept the responsibility of his job?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. adapt to changes in procedures or methods?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. respect the authority of his supervisor?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. work as a member of a team?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
50. get along with his supervisors?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51. perform repetitive tasks?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52. get along with his co-workers?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
53. perform tasks requiring variety and change in methods? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If you could make the decision, would you . . .	yes	not sure	no
54. promote him to a position of more responsibility? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55. transfer him (her) to another job at the same level? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56. fire him (her)?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 57. Check the group most true of this worker:

- Thoroughly settled down; never have to worry about him; no trouble to me at all; well adjusted to the job..... ☐
- Has settled down better than average; seldom need to worry about him; not much trouble to me; fairly well adjusted to the job ..... ☐
- Average ..... ☐
- Has settled down less well than average; quite often have to worry about him; is a lot of trouble to me; not very well adjusted to the job ..... ☐
- Has never really settled down; always have to worry about him; one of my headaches; poorly adjusted to the job..... ☐

## 58. Now will you please consider this worker with respect to his over-all competence, the effectiveness with which he performs his job, his proficiency, his general over-all value. Take into account all the elements of successful job performance, such as knowledge of the job and functions performed, quantity and quality of output, relations with other people (subordinates, equals, superiors), ability to get the work done, intelligence, interest, response to training, and the like. In other words, how closely does he approximate the ideal, the kind of worker you want more of? With all these factors in mind, where would you rank this worker as compared with the other people whom you now have doing the same work? (or, if he is the only one, how does he compare with those who have done the same work in the past?)

- In the top  $\frac{1}{4}$  ..... ☐
- In the top half but not among the top  $\frac{1}{4}$  ..... ☐
- In the bottom half but not among the lowest  $\frac{1}{4}$  ..... ☐
- In the lowest  $\frac{1}{4}$  ..... ☐

## 59. Compared to the others in his (her) work group, how well do you know this worker?

- not as well..... ☐      about the same..... ☐      better..... ☐

**Thank you very much for your cooperation**

## SATISFACTORINESS QUESTIONNAIRE

Please check the best answer for each question

Be sure to answer *all* questions

Compared to others in his work group, how well does he . . .	not as well	about the same	better
1. follow company policies and practices?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. accept the direction of his supervisor?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. follow standard work rules and procedures?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. perform tasks requiring repetitive movements?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. accept the responsibility of his job?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. adapt to changes in procedures or methods?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. respect the authority of his supervisor?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. work as a member of a team?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. get along with his supervisors?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. perform repetitive tasks?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. get along with his co-workers?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. perform tasks requiring variety and change in methods? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

  

Compared to others in his work group . . .	not as good	about the same	better
13. how good is the quality of his work?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. how good is the quantity of his work?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

  

If you could make the decision, would you . . .	yes	not sure	no
15. give him a pay raise?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. transfer him to a job at a higher level? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. promote him to a position of more responsibility? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Please check the best answer for each question  
Be sure to answer *all* questions

Compared to others in his work group, how often does he . . .	less	about the same	more
18. come late for work?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. become overexcited? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. become upset and unhappy?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. need disciplinary action? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. stay absent from work? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. seem bothered by something?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. complain about physical ailments?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. say "odd" things?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. seem to tire easily?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. act as if he is not listening when spoken to?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. wander from subject to subject when talking?.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p>29. Now will you please consider this worker with respect to his over-all competence, the effectiveness with which he performs his job, his proficiency, his general over-all value. Take into account all the elements of successful job performance, such as knowledge of the job and functions performed, quantity and quality of output, relations with other people (subordinates, equals, superiors), ability to get the work done, intelligence, interest, response to training, and the like. In other words, how closely does he approximate the ideal, the kind of worker you want more of? With all these factors in mind, where would you rank this worker as compared with the other people whom you now have doing the same work? (or, if he is the only one, how does he compare with those who have done the same work in the past?)</p>			
In the top ¼ .....	<input type="checkbox"/>		
In the top half but not among the top ¼ .....	<input type="checkbox"/>		
In the bottom half but not among the lowest ¼ .....	<input type="checkbox"/>		
In the lowest ¼ .....	<input type="checkbox"/>		

**Thank you very much for your cooperation**

## MINNESOTA STUDIES IN VOCATIONAL REHABILITATION

- \*I. Research Plan and Bibliography.
- \*II. A Study of Referral Information.
- \*III. A Follow-up Study of Placement Success.
- \*IV. A Study of 1,637 DVR Counselees.
- \*V. Methodological Problems in Rehabilitation Research.
- \*VI. A Survey of the Physically Handicapped in Minnesota.
- \*VII. Factors Related to Employment Success.
- \*VIII. A Study of ES Applicants.
- IX. The Application of Research Results.
- \*X. A Definition of Work Adjustment.
- \*XI. Attitudinal Barriers to Employment.
- \*XII. Validity of Work Histories Obtained by Interview.
- \*XIII. The Measurement of Employment Satisfaction.
- \*XIV. The Measurement of Employment Satisfactoriness.
- \*XV. A Theory of Work Adjustment.
- XVI. The Measurement of Vocational Needs.
- XVII. Disability and Work.
- XVIII. Construct Validation Studies of the Minnesota Importance Questionnaire.
- XIX. An Inferential Approach to Occupational Reinforcement.
- XX. Seven Years of Research on Work Adjustment.
- XXI. Instrumentation for the Theory of Work Adjustment.

Titles preceded by an asterisk are out of print. Single copies of the other monographs are available without charge from the following address:

Work Adjustment Project  
Industrial Relations Center  
University of Minnesota  
Minneapolis, Minnesota 55455