1967

Factor analytically derived scales for the strong vocational interest blank

Charles Joseph Cranny

Iowa State University

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STRONG VOCATIONAL INTEREST BLANK,

Iowa State University of Science and Technology, Ph.D., 1967
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FACTOR ANALYTICALLY DERIVED SCALES FOR THE STRONG VOCATIONAL INTEREST BLANK

by

Charles Joseph Cranny

A Dissertation Submitted to the Graduate Faculty in Partial Fulfillment of The Requirements for the Degree of

DOCTOR OF PHILOSOPHY

Major Subject: Psychology

Approved:

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In Charge of Major Work

Signature was redacted for privacy.

Head of Major Department

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Dean of Graduate College

Iowa State University
Of Science and Technology
Ames, Iowa

1967
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION AND LITERATURE REVIEW</td>
<td>1</td>
</tr>
<tr>
<td>Purpose</td>
<td>12</td>
</tr>
<tr>
<td>METHOD</td>
<td>14</td>
</tr>
<tr>
<td>Subjects</td>
<td>14</td>
</tr>
<tr>
<td>Procedure</td>
<td>14</td>
</tr>
<tr>
<td>RESULTS AND DISCUSSION</td>
<td>19</td>
</tr>
<tr>
<td>The Factors</td>
<td>19</td>
</tr>
<tr>
<td>Residuals</td>
<td>44</td>
</tr>
<tr>
<td>Factor Scales</td>
<td>47</td>
</tr>
<tr>
<td>Factor Comparisons</td>
<td>48</td>
</tr>
<tr>
<td>Suggestions for Research</td>
<td>50</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>51</td>
</tr>
<tr>
<td>LITERATURE CITED</td>
<td>53</td>
</tr>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>56</td>
</tr>
<tr>
<td>APPENDIX A: FACTOR MATRIX</td>
<td>57</td>
</tr>
<tr>
<td>APPENDIX B: FACTOR SCALES</td>
<td>68</td>
</tr>
</tbody>
</table>
INTRODUCTION AND LITERATURE REVIEW

The measurement of interests is less than fifty years old (Fryer, 1931). Prior to 1920, an attempt to state a clear definition of interests which would be generally accepted by psychologists would have been difficult. Fryer points out that by 1930 interests were more clearly defined by their measurement. With the development of measuring techniques, interests were named and defined by the "...objects and activities, the psychological stimuli, which engage the attention of the individual" (Fryer, 1931).

Fryer distinguished between subjective and objective interests. As Darley and Hagenah (1955) point out, relatively little work has been done in the area of objective interest measurement. Most of the work since 1929 has been of the subjective type. "Subjective interests are of two kinds, which are determined by the two feelings of pleasantness and unpleasantness that accompany the interest experiences. In a measurement sense, subjective interests are likes, which are estimated experiences characterized by feelings of pleasantness, and aversions are dislikes, which are estimated experiences characterized by feelings of unpleasantness. Indifferent experiences mark off these two" (Fryer, 1931). The term "interest" is now used to include both likes and dislikes.

Measurement of subjective interests has been done largely by means of some form of interest inventory. An interest inventory consists of a list of interest situations to each of which an individual responds by indicating whether he likes, dislikes, or is indifferent to the object or activity or by indicating his relative preferences within a group of
such stimuli.

Some early forms of the interest inventory (Miner, 1922; Mills, 1924) listed broad categories of activity such as "outside work", "creative work", etc. Estimates of the type of occupation for which an individual was best suited in terms of his interests were made from such inventories. Such estimates were little more than guesses about what kinds of activities were required by particular occupations. Most inventories of this type were inspected rather than scored. A summary score based on number or intensity of interests would be difficult to interpret meaningfully.

Most investigators in the area of interest measurement have worked with group interests. Instead of assembling the results of an interest inventory into a score for general interests, the purpose has been to assemble them into scores reflecting interests in particular occupations or fields of activity. This approach assumes that each grouping of people under investigation has a pattern of interests in common which is different from that of some other group.

Terman (1925), in his study of gifted and normal children, used interest inventories to discriminate between the two groups on the basis of their educational and occupational interests. He found differences in the percentage of gifted and control groups indicating interest in various occupations and in different school subjects.

Shuttleworth (1929) used an interest inventory composed of 200 items to which his subjects responded by indicating whether they liked, disliked, or were indifferent to each item. He administered the
inventory to 60 students at the University of Iowa, 29 of whom were receiving high grades, and 31 of whom were receiving low grades. He found items which discriminated between the two groups, but did not base scales for prediction of grades on them. His attempt to distinguish between energetic and lazy students as rated by their teachers identified 40 interest inventory items which discriminated between the two groups. Scales constructed from these items were unsuccessful in predicting grades (Shuttleworth, 1929).

The earliest work on the standardized interest inventory in the form which has been most widely used was begun at the Carnegie Institute of Technology in 1919. It was characterized by an emphasis on construction with a statistically evaluated standardization technique and an objectively verifiable scoring method. "This work began in the collection of items for the inventory in the graduate student seminar of Clarence S. Yoakum in 1919-20. From these beginnings has grown the general interest inventory in its various forms" (Fryer, 1931).

A number of inventories were constructed on the basis of the list of about 1,000 items which was assembled in Yoakum's seminars. The first of these was a list of 20 occupational items used by Moore in an attempt to differentiate between sales and design engineers (Moore, 1921, 1923). Ten of the items were of mechanical interests and ten of social interests, as judged by fourteen judges. Items were included on the basis of agreement among the judges. The subjects checked ten of the twenty occupations at which they would prefer to work. The score for an individual was the number of social items checked plus the number of
unchecked mechanical items, divided by the total number of items. High scores indicated social interests; low scores, mechanical interests. The inventory correctly placed 82 per cent of the design engineers tested and 78 per cent of the sales engineers.

Moore's *a priori* choice of significant items in his scoring key is the major difference between his work and that of later investigators. After Moore, scoring of the inventory was based on an analysis of the responses.

Ream developed a method of scoring an interest inventory based on objective criteria which has been extensively used and refined by others (Strong, 1943). He calculated the percentages of 27 successful and 12 unsuccessful salesmen who liked, disliked, and were indifferent to each item and determined the standard error of the difference between the percentages of the two groups. When the difference equaled or exceeded the critical ratio, the item was given a weight of one; all other items were disregarded. The weight was positive if more successful salesmen responded to the item than unsuccessful salesmen; otherwise it was negative. The formulas used in calculating the weights are given in Strong (1943) and in Fryer (1931). An individual's score was the algebraic sum of the positive and negative weights.

Freyd (1924) modified Ream's scoring procedure by weighting an item only when the difference exceeded twice the critical ratio.

Cowdery (1926) further modified the scoring procedure in his attempt to differentiate the occupational groups of physician, engineer, and lawyer. Cowdery felt that Freyd's procedure was unsatisfactory because
it gave no more advantage to items having large significant differences than to items which barely met Freyd's criterion and because it did not use items with smaller differences which Cowdery felt should be weighted according to their degree of significance. Using a formula developed by T. L. Kelley, Cowdery developed a system of weights for each item which ranged from plus fifteen to minus fifteen. In preparing his scoring keys for each of his occupational groups, Cowdery used the combination of the other two occupational groups as a comparison group.

Miner (1926) attempted to differentiate four groups of students by contrasting the interests of each group with those of a fifth group chosen alphabetically without regard to occupation.

Strong, working at first with a modification of Cowdery's inventory and a modification of the weighted scoring procedure, devised scoring keys for each of eighteen occupational groups. Strong reasoned that it was best to use a "men in general" group as a common point of reference and differentiate between this group and each occupational group. In his preliminary experiment the "men in general" group which was compared with each occupational group was composed of a combination of the other seventeen occupational groups (Fryer, 1931). After preliminary research with Cowdery's inventory, Strong constructed the first Strong Vocational Interest Blank (SVIB) which was published in May, 1927. It consisted of 420 items, including 182 from Cowdery's form. By 1931 there were 31 occupational keys available. These keys were constructed by comparing the responses of people engaged in these occupations with the responses of 3290 "men in general" made up of the members of sixteen
primary occupational groups and 894 college students. Since its original publication, Strong's inventory has become "...the most extensively validated instrument available in this domain of measurement" (Darley and Hagenah, 1955). Buros (1965) lists 614 publications concerning the SVIB. No attempt at a comprehensive review of this literature is made here because of its extensive nature and because only a small portion of it is directly relevant to the present study. A number of excellent reviews of this research activity and comments concerning the SVIB are available (Fryer, 1931; Strong, 1943; Berdie, 1944; Strong, 1955; Darley and Hagenah, 1955; Layton, 1960).

A revision of the SVIB in 1938 (Form M) reconstituted the "men in general" group and reduced the number of items to 400. Another revision is presently in progress (Campbell, 1965) and a new form of the inventory (Form T399R) has been published. The new form uses a modified "men in general" group and has 288 items in common with Form M. The scoring system has been changed by reducing the range of item weights from plus one to minus one rather than the previously used plus four to minus four. Various aspects of the latest revision are discussed by Strong (1962; 1963) and by Campbell (1965).

The rationale and scoring procedure of the SVIB have remained essentially the same since its first publication. Occupational scoring keys are constructed by comparing the responses to each item of people judged to be at least minimally successful in a particular occupation with those of a "men in general" group. An item is weighted into an occupational score according to how significant a differentiation of
the two groups results for that item. Most of the items in the inventory are included with some weight in more than one occupational key. A score on an occupational scale of the SVIB thus expresses the extent to which a person exhibits reported likes and dislikes which distinguish members of that occupational group from men in general (Strong, 1959). Thus the instrument is more accurately thought of as a measure of similarity of interest rather than "interest in" some area of activity.

Darley and Hagenah (1955) estimate that the total number of men employed in the occupations for which the SVIB is scored does not exceed twenty per cent of the total male work force. They make this point to illustrate the need for grouping occupations in order to deal with behavior of a more general nature. Such groupings should be helpful in identifying some dimensions of occupational interests which would be useful in forming occupational interest families. Attempts to group occupational interests have been made by a number of investigators.

In an attempt to study changes in interest patterns with changes in age, Strong developed a classification system which arranged the 400 items on the interest blank into 25 groups. The classification system was based on his judgment concerning the content of the items. Items which were judged to have similar content were placed in the same group (Strong, 1943). Strong realized the weaknesses of such a classification system, but felt that there was no reasonable alternative to this method of classifying the items since the large number of items made a factor analysis of the item intercorrelations impractical at that time.

Strong has obtained intercorrelations among scores on the
occupational scales on the blank and he has also grouped occupations on the basis of these correlations (Strong, 1943). The result was eleven groups, four of which contained only one individual occupation. An occupation was included in a group if it correlated .60 with other members of the group, and lower than .60 with other groups. Four of the groups contained occupations which Strong felt could be summarized by naming them. Group II is concerned with physical sciences and mathematics; Group V, with handling people for their presumed good; Group IX, with sales; and Group X, with linguistic activities. Groups III, VI, and XI each had only one member. Groups I and IV were too diverse in content to be summarized by a name.

Occupations have also been classified by means of factor analysis. Thurstone (1931), using a table of intercorrelations among scores on scales for eighteen occupations, calculated the factor loadings of each occupation. This analysis resulted in four factors which he called "science", "language", "people", and "business". As additional occupational scales were developed, four more factor analyses were carried out by Strong. These four analyses were based upon 25, 30, 32, and 36 variables respectively (Strong, 1943). Thurstone's analysis, and the first three of Strong's, were based on the occupational scales in use before 1938. According to Strong (1943), the unrotated factor loadings remained quite constant from analysis to analysis, as did the relationships between pairs of occupations, for all five analyses. In comparing the results of the five analyses, Strong found high agreement between any one of the first four factors in one analysis with some one of the
factors in another analysis. This same agreement is not true of a fifth factor extracted in Strong's analyses.

Carter, Pyles, and Bretnal (1935), in two factor analyses of scores of high school boys, found similar agreement between Thurstone's first three factors and their first three factors. Comparisons of the fourth factor in the three analyses, however, found little agreement (Carter et al., 1935).

On the basis of data from some of Strong's factor analyses cited above, Darley (1941) grouped the scoring keys available into seven classifications: I Technical, II Verbal or linguistic, III Business contact, IVA and IVB Welfare or uplift, V Business detail, and VI Certified public accountant.

Other factor analyses have been done which include scores on the SVIB as variables along with scores from other measures. Ferguson, Humphries, and Strong (1945) computed a factor analysis from scores of 93 Stanford University students on eight scales of the SVIB and all six scales of the Allport-Vernon Study of Values. They extracted five factors, three of which had significant loadings from the interest scales. They compared these three to Thurstone's "language", "people", and "science" factors.

Cottle (1950) included six group scales from the SVIB in a factor analysis of scores from personality and interest tests. He extracted seven bipolar factors, five of which he interpreted as interest factors. These were "things versus people", "business contact versus scientific interest", "business detail" with some negative loadings on biological
science and social welfare, an unnamed factor which he suggested might be concerned with prestige or status, and an "altruistic, humanism, or social" factor. Some of his factors seem similar to those identified by other investigators such as Thurstone and Strong, but Cottle's use of group scales, rather than occupational scales, makes comparison difficult.

Torr (1952) factor analyzed 49 variables from seven interest inventories. The only scale included from the SVIB was the Masculinity-Feminity scale. He reported six interpretable factors as interests in mechanics, people, esthetics, science, nature, and business.

In one of the largest factor analyses done with interests, Guilford and his associates (Guilford, Christensen, Bond, and Sutton, 1954) hypothesized the existence of 33 interest factors and formulated a number of sub-hypotheses concerning these interests. They constructed 100 subtests of 10 items each. The items dealt with activity, self-description, and attitudes and belief. The complete inventory was administered to a sample of 600 airmen and 720 Air Force officers. When the sub-test scores were factor analyzed, 24 factors were isolated for the airmen, and 23 for the officers, 17 of these factors being identical. Eight of these were clearly interest factors, the others were concerned with other personality factors. The eight interest factors were named "scientific", "social-welfare", "mechanical", "outdoor", "clerical", "business", "aesthetic expression", and "aesthetic appreciation".

Super and Crites (1962) have reviewed the literature on the factor analysis of interests and have developed their own list of interest
factors. They are based primarily upon agreement among the various factor analysis studies and are intended to serve as a summary of work on interest factors. Super and Crites list eight factors: "science", "social welfare", "material or working with things", "systematic or record-keeping", "business contact", "aesthetic appreciation", and "aesthetic expression". They feel that each of these is represented in some form in a number of the factor analyses cited.

The use of occupational scale scores as variables in factor analysis has been criticized by Guilford (1952) as being inappropriate under most conditions of analysis. Guilford points out that each item weighted in two scores makes a contribution of the obtained correlation between those scores. Since part of an item's contribution to any total score includes some specific and error variance, these specific and error variances contribute to the intercorrelations of scores. "The positive and negative intercorrelations among scores on the Strong Vocational Interest Blank are quite generally influenced by the multi-scoring technique which contributes identical specific and error variances to two or more scores. To what extent the intercorrelations of multi-scored inventories represent actual degrees of relationship of the variables the test author intended to measure and to what extent they represent these incidental communities of specific and error variances is unknown" (Guilford, 1952).

The apparent reason for using occupational scale scores as variables for analysis rather than using the individual item scores has been the difficulty in dealing with such a large number of variables.
Techniques and computing facilities now available, however, have reduced the task to manageable proportions. The desirability of determining the factorial content of the SVIB has been widely recognized (e.g., Darley and Hagenah, 1955; Clark, 1960; Tyler, 1960; Strong, 1943). Guilford (1952) has pointed out some conditions which make meaningful interpretation of previous factor analyses of the SVIB doubtful. A factor analysis using the individual item scores as variables would avoid the problems pointed out by Guilford.

Purpose

The primary purpose of this study is to carry out a factor analysis of the SVIB items, using the 288 items from Form B which are included in Form T399R and to construct measurement scales for the resulting factors.

As noted above, the desirability of determining the factorial content of the SVIB has been widely recognized. In addition to our present information concerning the similarities of the interests of various groups of people, knowledge of the factorial content of the SVIB should enhance our knowledge of what those interests are.

The present research is intended a preliminary step toward what Campbell (1965) has called "...the overwhelming need--a theoretical structure to guide our efforts". Progress in the development of such a structure should be facilitated when the nature of interests, i.e., the theoretical constructs underlying interest measurement, is better defined. The present study is intended to develop the foundations for this definition. It is assumed here that understanding, as distinct
from merely predicting, is a significant first step toward the development of a larger network of interest concepts which should serve to guide our future research efforts.
METHOD

Subjects

Data were obtained from the Center for Interest Measurement Research at the University of Minnesota on a sample of 500 subjects from a "men in general" group. These data were in the form of responses to each of the items on the SVIB.\(^1\) The men in general group used was the same as that used for the SVIB during the period from 1938 to 1965. Strong has described the characteristics of this group in detail (Strong, 1943).

Procedure

The item responses of the group of 500 men in general were used for the factor analysis. Only those 288 items which are common to both Form M and the revised form were included in the analysis. The intercorrelations between the items were obtained. The resulting matrix of intercorrelations was examined and items were arranged in clusters on the basis of the magnitude of the intercorrelations among the items in a cluster. In order to insure that the intercorrelations within a cluster were higher on the average than intercorrelations between items in different clusters, the correlations between the best item from each

\(^{1}\) The writer wishes to express his appreciation to Dr. David P. Campbell of the Center for Interest Measurement Research, University of Minnesota, for making these data available.
cluster were inspected. The items in each cluster were then inspected for psychological content and those items which seemed to differ from the content of the other items in the cluster were marked, but not eliminated at that point. An index of internal consistency was computed for the three items in a cluster which exhibited the highest correlation with each other and with the other items in the cluster. This index was computed using the formula

\[
\frac{n \bar{r}_{jj}'}{1 + (n-1) \bar{r}_{jj}'}
\]

where \( n \) refers to the number of items in the cluster and \( \bar{r}_{jj}' \) refers to the average intercorrelation among the items. The remaining items from the original cluster were added to the new cluster one at a time and the consistency index was computed after each such addition. The final cluster was composed of those items which, in combination yielded the highest value for the index. Those few items which appeared in more than one cluster were eliminated from all clusters. Only one of the ipsative forced-choice items appeared in any cluster.

The items remaining in each cluster were again examined regarding rational consistency. In general, it was found that those items which previously had been judged doubtful on the basis of content had been eliminated through their failure to contribute to the internal consistency of the clusters. That is, those items which appeared less related to the general theme of the cluster also correlated lower with the remaining items. Eighty-eight items in 15 mutually exclusive groups resulted from this analysis.
Thurstone's multiple group method of factor analysis (Thurstone, 1947) was followed. For each cluster one factor was extracted. A convergence criterion of .005 on the factor loadings was used. These factor loadings squared were used in the diagonal of the 288 by 288 correlation matrix rather than unities.

The 288 by 288 intercorrelation matrix (with communality estimates used as diagonal entries), R, was premultiplied by a 15 by 288 matrix, S. The entries in S were +1, 0, or -1. The rows of S represented the clusters. A non-zero entry in a row indicated that the item belonged in a cluster and the sign (+ or -) indicated the direction the item was scored to obtain all positive correlations within a cluster (reflection).

The adjusted matrix of intercorrelations (angular cosines) between the clusters (oblique factors), P, was obtained by the following formula: $SRS' = C$ and $P = (\text{tr } C)^{-\frac{1}{2}} \cdot C \cdot (\text{tr } C)^{-\frac{1}{2}}$. That is, the matrix product previously described was postmultiplied by the transpose of the S matrix. The reciprocal square-root of the diagonal entries in the resulting 15 by 15 matrix, C, were obtained. The C matrix was pre- and postmultiplied by this diagonal matrix in order to obtain the angular cosines among the 15 oblique factors.

Four general factors were extracted from the 15 by 15 matrix, P, using Lawley's maximum-likelihood procedure (Lawley, 1940). The residuals were reduced to less than .00005 by placing small loadings on the

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The writer wishes to express his appreciation to Professor Howard W. Jesperson of the Department of Statistics, Iowa State University, for writing the program for the factor analysis.
15 specific factors. That is, the first row of residuals was "cleaned up" and the communality for that row was made to be 1.0000. A new residual table was computed and the second row of residuals was "cleaned up" and the communality for the second row was made to be 1.0000, and so forth.

The four general factors were rotated as follows: four groups of variables were chosen from the 15 clusters. Within each group the variables had the same profile of factor loadings on the four extracted factors and were judged to be rationally coherent. The factors were rotated obliquely through four points, each of which was the average of the variables in the group.

Wherry's hierarchical factor solution was applied (Wherry, 1959) to yield four sub-general and 15 group factors. The factor loadings on the 19 factors of each of the 288 SVIB items and their communalities were computed and a 288 by 288 residual table was obtained.

For each of the 15 group factors scatter-plots were made. Plotted were the item factor loading squared versus the communality minus the factor loading squared. The scatter-plots facilitated the identification of those items which were factorially simple (i.e., which were not factorially complex). For each factor an index of internal consistency was computed using the formula

\[ \frac{\bar{r}^2}{JK} \]

where \( \bar{r}^2 \) refers to the average of the squared factor loadings.
Those items which were factorially simple and which, in combination, yielded the highest value for the index, were included in the scale for that factor.

The 288 by 288 residual table was examined and the larger residuals (over .35) were identified with respect to the items involved. A group of items was identified which had no substantial loadings (over .20) on any of the 19 factors. Items were selected from this group to serve as a measure of this "residual factor".
RESULTS AND DISCUSSION

The factor loadings on the 19 factors of each of the 288 items are presented in Table 24 in Appendix A. The four sub-general factors are designated by the letters A, B, C, and D, respectively, and the 15 group factors are numbered 1 to 15, respectively.

Eight of the group factors were defined by items which also had substantial loadings on one of the sub-general factors. For sub-general factor A, these were group factors 8 and 11; for B, 1, 4, and 14; for C, 12 and 13; and for D, 7.

Of the 288 items in the analysis, 69 had no loading as high as .20 on any of the 19 factors.

The Factors

Table 1 lists the items most responsible for defining factor A.\(^3\) Items with high loadings on this factor seem to indicate interest in physical science (e.g. items 23, 108, 32, 24, and 128), mathematics (e.g. items 120, 107, and 85), and mechanics (e.g. items 56, 148, 186, 94, and 122). The other items with loadings on this factor also seem to be consistent with a summary label such as "technical work" or "work with things".

The items most responsible for defining factor B are listed

\(^3\)In this and all other tables in this paper, decimal points for factor loadings and correlation coefficients have been omitted.
### Table 1. Sub-general factor A

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
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<tbody>
<tr>
<td>32</td>
<td>Electrical engineer</td>
<td>66</td>
</tr>
<tr>
<td>49</td>
<td>Laboratory technician</td>
<td>58</td>
</tr>
<tr>
<td>61</td>
<td>Mining superintendent</td>
<td>52</td>
</tr>
<tr>
<td>148</td>
<td>Solving mechanical puzzles</td>
<td>52</td>
</tr>
<tr>
<td>91</td>
<td>Statistician</td>
<td>30</td>
</tr>
<tr>
<td>341</td>
<td>Work involving few details</td>
<td>-21</td>
</tr>
<tr>
<td>13</td>
<td>Auto repairman</td>
<td>49</td>
</tr>
<tr>
<td>56</td>
<td>Machinist</td>
<td>63</td>
</tr>
<tr>
<td>94</td>
<td>Toolmaker</td>
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<tr>
<td>132</td>
<td>Shop work</td>
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<tr>
<td>186</td>
<td>Repairing a clock</td>
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</tr>
<tr>
<td>187</td>
<td>Adjusting a carburetor</td>
<td>52</td>
</tr>
<tr>
<td>188</td>
<td>Repairing electrical wiring</td>
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<td>189</td>
<td>Cabinetmaking</td>
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<tr>
<td>190</td>
<td>Operating machinery</td>
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<tr>
<td>368</td>
<td>Have mechanical ingenuity (inventiveness)</td>
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<td>98</td>
<td>Watchmaker</td>
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<td>185</td>
<td>Making a radio set</td>
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<td>55</td>
<td>Locomotive engineer</td>
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<td>180</td>
<td>&quot;Popular Mechanics&quot;</td>
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<td>101</td>
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<td>Carpenter</td>
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<td>Mechanical drawing</td>
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</tr>
<tr>
<td>6</td>
<td>Astronomer</td>
<td>38</td>
</tr>
<tr>
<td>288</td>
<td>Prepare the advertising for the machine</td>
<td>32</td>
</tr>
<tr>
<td>144</td>
<td>Chess</td>
<td>24</td>
</tr>
<tr>
<td>283</td>
<td>Discover an improvement in the design of the machine</td>
<td>43</td>
</tr>
<tr>
<td>281</td>
<td>Develop the theory of operation of a new machine, e.g., auto</td>
<td>46</td>
</tr>
<tr>
<td>17</td>
<td>Building contractor</td>
<td>41</td>
</tr>
<tr>
<td>67</td>
<td>Pharmacist</td>
<td>47</td>
</tr>
<tr>
<td>128</td>
<td>Poker</td>
<td>57</td>
</tr>
</tbody>
</table>
Table 1. (Continued)

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>108</td>
<td>Chemistry</td>
<td>64</td>
</tr>
<tr>
<td>24</td>
<td>Civil engineer</td>
<td>64</td>
</tr>
<tr>
<td>14</td>
<td>Aviator</td>
<td>26</td>
</tr>
<tr>
<td>211</td>
<td>Pursuing bandits in sheriff's posse</td>
<td>20</td>
</tr>
<tr>
<td>25</td>
<td>Civil service employee</td>
<td>20</td>
</tr>
<tr>
<td>285</td>
<td>Supervise the manufactur of the machine</td>
<td>25</td>
</tr>
<tr>
<td>114</td>
<td>Physiology</td>
<td>33</td>
</tr>
</tbody>
</table>

in Table 2. Items with the highest loadings on this factor are those dealing with writing (e.g. items 57, 9, 31, and 40) and art (e.g. items 5 and 84). There are also loadings from most of the items dealing with music and from some items that seem to be concerned with the practice of law. Figure 24 in Appendix A shows that the law items have loadings on a number of factors, including factor C as well as B. Labels suggested for factor B are "cultural-aesthetic expression" or "cultural-linguistic".

Table 3 lists the items defining factor C. The items with high loadings are those concerned with buying and selling for business and with sales activities (e.g. items 99, 18, 33, and 219, and items 197,
## Table 2. Sub-general factor B

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>College professor</td>
<td>41</td>
</tr>
<tr>
<td>53</td>
<td>Librarian</td>
<td>42</td>
</tr>
<tr>
<td>112</td>
<td>English composition</td>
<td>40</td>
</tr>
<tr>
<td>119</td>
<td>Literature</td>
<td>42</td>
</tr>
<tr>
<td>116</td>
<td>History</td>
<td>25</td>
</tr>
<tr>
<td>118</td>
<td>Languages, modern</td>
<td>25</td>
</tr>
<tr>
<td>134</td>
<td>Spelling</td>
<td>21</td>
</tr>
<tr>
<td>215</td>
<td>Writing reports</td>
<td>21</td>
</tr>
<tr>
<td>274</td>
<td>Socialists</td>
<td>21</td>
</tr>
<tr>
<td>284</td>
<td>Determine the cost of the machine</td>
<td>-21</td>
</tr>
<tr>
<td>378</td>
<td>Can write a concise, well-organized report</td>
<td>24</td>
</tr>
<tr>
<td>9</td>
<td>Author of novel</td>
<td>63</td>
</tr>
<tr>
<td>31</td>
<td>Editor</td>
<td>62</td>
</tr>
<tr>
<td>40</td>
<td>Foreign correspondent</td>
<td>51</td>
</tr>
<tr>
<td>57</td>
<td>Physician</td>
<td>65</td>
</tr>
<tr>
<td>5</td>
<td>Artist</td>
<td>48</td>
</tr>
<tr>
<td>84</td>
<td>Sculptor</td>
<td>46</td>
</tr>
<tr>
<td>20</td>
<td>Cartoonist</td>
<td>41</td>
</tr>
<tr>
<td>163</td>
<td>Art galleries</td>
<td>36</td>
</tr>
<tr>
<td>233</td>
<td>Looking at a collection of antique furniture</td>
<td>20</td>
</tr>
</tbody>
</table>
Table 2. (Continued)

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>66</td>
<td>Orchestra conductor</td>
<td>45</td>
</tr>
<tr>
<td>167</td>
<td>Symphony concerts</td>
<td>23</td>
</tr>
<tr>
<td>41</td>
<td>Governor of a state</td>
<td>37</td>
</tr>
<tr>
<td>109</td>
<td>Civics</td>
<td>22</td>
</tr>
<tr>
<td>48</td>
<td>Labor arbitrator</td>
<td>33</td>
</tr>
<tr>
<td>47</td>
<td>Judge</td>
<td>42</td>
</tr>
<tr>
<td>51</td>
<td>Lawyer, criminal</td>
<td>30</td>
</tr>
<tr>
<td>26</td>
<td>Clergyman</td>
<td>28</td>
</tr>
<tr>
<td>255</td>
<td>Foreigners</td>
<td>30</td>
</tr>
<tr>
<td>203</td>
<td>Teaching adults</td>
<td>23</td>
</tr>
<tr>
<td>200</td>
<td>Organizing a play</td>
<td>32</td>
</tr>
<tr>
<td>1</td>
<td>Actor (not movie)</td>
<td>38</td>
</tr>
<tr>
<td>172</td>
<td>Poetry</td>
<td>30</td>
</tr>
<tr>
<td>110</td>
<td>Dramatics</td>
<td>38</td>
</tr>
<tr>
<td>126</td>
<td>Philosophy</td>
<td>27</td>
</tr>
<tr>
<td>345</td>
<td>Physical activity vs mental activity</td>
<td>-22</td>
</tr>
<tr>
<td>44</td>
<td>Interpreter</td>
<td>46</td>
</tr>
<tr>
<td>Item number</td>
<td>Item</td>
<td>Factor loading</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>196</td>
<td>Interviewing men for a job</td>
<td>51</td>
</tr>
<tr>
<td>158</td>
<td>Conventions</td>
<td>32</td>
</tr>
<tr>
<td>351</td>
<td>Amusement where there is a crowd</td>
<td>31</td>
</tr>
<tr>
<td>41</td>
<td>Governor of a state</td>
<td>30</td>
</tr>
<tr>
<td>8</td>
<td>Auctioneer</td>
<td>24</td>
</tr>
<tr>
<td>15</td>
<td>Bank teller</td>
<td>26</td>
</tr>
<tr>
<td>86</td>
<td>Secret service man</td>
<td>21</td>
</tr>
<tr>
<td>153</td>
<td>Amusement parks</td>
<td>28</td>
</tr>
<tr>
<td>171</td>
<td>Sporting pages</td>
<td>22</td>
</tr>
<tr>
<td>236</td>
<td>Energetic people</td>
<td>24</td>
</tr>
<tr>
<td>242</td>
<td>People who are natural leaders</td>
<td>27</td>
</tr>
<tr>
<td>243</td>
<td>People who assume leadership</td>
<td>24</td>
</tr>
<tr>
<td>245</td>
<td>People who have made fortunes in business</td>
<td>28</td>
</tr>
<tr>
<td>271</td>
<td>Fashionably dressed people</td>
<td>20</td>
</tr>
<tr>
<td>273</td>
<td>People who don't believe in evolution</td>
<td>22</td>
</tr>
<tr>
<td>324</td>
<td>Head waiter vs. lighthouse tender</td>
<td>26</td>
</tr>
<tr>
<td>328</td>
<td>Develop plans vs. execute plans</td>
<td>-24</td>
</tr>
<tr>
<td>329</td>
<td>Do a job yourself vs. delegate job to</td>
<td>-24</td>
</tr>
<tr>
<td></td>
<td>another</td>
<td></td>
</tr>
<tr>
<td>355</td>
<td>Few intimate friends vs. many acquaintances</td>
<td>-23</td>
</tr>
<tr>
<td>198</td>
<td>Interviewing clients</td>
<td>43</td>
</tr>
<tr>
<td>209</td>
<td>Adjusting difficulties of others</td>
<td>34</td>
</tr>
</tbody>
</table>
Table 3. (Continued)

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>364</td>
<td>Usually get other people to do what I want done</td>
<td>20</td>
</tr>
<tr>
<td>382</td>
<td>Put drive into the organization</td>
<td>28</td>
</tr>
<tr>
<td>386</td>
<td>Smooth out tangles and disagreements between people</td>
<td>23</td>
</tr>
<tr>
<td>331</td>
<td>Deal with things <em>vs.</em> deal with people</td>
<td>-36</td>
</tr>
<tr>
<td>201</td>
<td>Opening conversation with a stranger</td>
<td>31</td>
</tr>
<tr>
<td>206</td>
<td>Meeting and directing people</td>
<td>36</td>
</tr>
<tr>
<td>21</td>
<td>Cashier in bank</td>
<td>36</td>
</tr>
<tr>
<td>219</td>
<td>Buying merchandise for a store</td>
<td>47</td>
</tr>
<tr>
<td>65</td>
<td>Office manager</td>
<td>46</td>
</tr>
<tr>
<td>226</td>
<td>Developing business systems</td>
<td>41</td>
</tr>
<tr>
<td>217</td>
<td>Bargaining (&quot;swapping&quot;)</td>
<td>36</td>
</tr>
<tr>
<td>220</td>
<td>Displaying merchandise in a store</td>
<td>34</td>
</tr>
<tr>
<td>35</td>
<td>Factory manager</td>
<td>45</td>
</tr>
<tr>
<td>347</td>
<td>Technical responsibility (25 people) <em>vs.</em> supervisory responsibility (300 people)</td>
<td>-44</td>
</tr>
<tr>
<td>58</td>
<td>Manufacturer</td>
<td>36</td>
</tr>
<tr>
<td>33</td>
<td>Employment manager</td>
<td>50</td>
</tr>
<tr>
<td>99</td>
<td>Wholesaler</td>
<td>55</td>
</tr>
<tr>
<td>18</td>
<td>Buyer of merchandise</td>
<td>55</td>
</tr>
<tr>
<td>54</td>
<td>Life insurance salesman</td>
<td>41</td>
</tr>
<tr>
<td>11</td>
<td>Auto salesman</td>
<td>46</td>
</tr>
<tr>
<td>Item number</td>
<td>Item</td>
<td>Factor loading</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>287</td>
<td>Sell the machine</td>
<td>40</td>
</tr>
<tr>
<td>320</td>
<td>Chairman, publicity committee</td>
<td>22</td>
</tr>
<tr>
<td>90</td>
<td>Specialty salesman</td>
<td>51</td>
</tr>
<tr>
<td>95</td>
<td>Traveling salesman</td>
<td>49</td>
</tr>
<tr>
<td>197</td>
<td>Interviewing prospects in selling</td>
<td>58</td>
</tr>
<tr>
<td>213</td>
<td>Acting as yell-leader</td>
<td>30</td>
</tr>
<tr>
<td>70</td>
<td>Playground director</td>
<td>32</td>
</tr>
<tr>
<td>229</td>
<td>Raising money for a charity</td>
<td>25</td>
</tr>
<tr>
<td>85</td>
<td>Secretary, Chamber of Commerce</td>
<td>43</td>
</tr>
<tr>
<td>42</td>
<td>Hotel keeper or manager</td>
<td>47</td>
</tr>
<tr>
<td>286</td>
<td>Create a new artistic effect, i.e., improve</td>
<td>-35</td>
</tr>
<tr>
<td></td>
<td>the beauty of the auto</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Advertiser</td>
<td>36</td>
</tr>
<tr>
<td>92</td>
<td>Stock broker</td>
<td>37</td>
</tr>
<tr>
<td>105</td>
<td>Bookkeeping</td>
<td>30</td>
</tr>
<tr>
<td>127</td>
<td>Physical training</td>
<td>20</td>
</tr>
<tr>
<td>111</td>
<td>Economics</td>
<td>27</td>
</tr>
<tr>
<td>376</td>
<td>Can write a concise, well-organized report</td>
<td>19</td>
</tr>
</tbody>
</table>
90, and 95). The content of factor C seems to be consistent with the label "business".

Table 4 lists those items with substantial loadings on Factor D. The items with the highest loadings on D are those dealing with the natural sciences (e.g. items 106, 125, 136, and 89). Social science items also have loadings on this factor. Since most of the natural and social science items have loadings on group factor 7, perhaps the most descriptive name for factor D would be "nature". This label is intended to take into account the items with smaller loadings on factor D which do not have loadings on other factors (e.g. items 154, 155, and 142) while still retaining some descriptive value for the items with loadings on factor 7.

Table 4. Sub-general factor D

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>147</td>
<td>Observing birds (nature study)</td>
<td>42</td>
</tr>
<tr>
<td>154</td>
<td>Picnics</td>
<td>33</td>
</tr>
<tr>
<td>258</td>
<td>Very old people</td>
<td>30</td>
</tr>
<tr>
<td>113</td>
<td>Psychology</td>
<td>21</td>
</tr>
<tr>
<td>135</td>
<td>Typewriting</td>
<td>22</td>
</tr>
<tr>
<td>142</td>
<td>Taking long walks</td>
<td>24</td>
</tr>
<tr>
<td>155</td>
<td>Excursions</td>
<td>26</td>
</tr>
<tr>
<td>182</td>
<td>Educational movies</td>
<td>22</td>
</tr>
<tr>
<td>Item number</td>
<td>Item</td>
<td>Factor loading</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>228</td>
<td>Contributing to charities</td>
<td>24</td>
</tr>
<tr>
<td>388</td>
<td>Discuss my ideals with others</td>
<td>21</td>
</tr>
<tr>
<td>-399</td>
<td>Frequently make wagers</td>
<td>20</td>
</tr>
<tr>
<td>106</td>
<td>Botany</td>
<td>53</td>
</tr>
<tr>
<td>125</td>
<td>Nature study</td>
<td>53</td>
</tr>
<tr>
<td>136</td>
<td>Zoology</td>
<td>49</td>
</tr>
<tr>
<td>133</td>
<td>Sociology</td>
<td>40</td>
</tr>
<tr>
<td>129</td>
<td>Psychology</td>
<td>31</td>
</tr>
<tr>
<td>184</td>
<td>Social problem movies</td>
<td>32</td>
</tr>
<tr>
<td>202</td>
<td>Teaching children</td>
<td>32</td>
</tr>
<tr>
<td>89</td>
<td>Social worker</td>
<td>40</td>
</tr>
<tr>
<td>194</td>
<td>Decorating a room with flowers</td>
<td>30</td>
</tr>
<tr>
<td>102</td>
<td>Languages, ancient</td>
<td>43</td>
</tr>
<tr>
<td>130</td>
<td>Physiology</td>
<td>38</td>
</tr>
<tr>
<td>250</td>
<td>Religious people</td>
<td>36</td>
</tr>
<tr>
<td>192</td>
<td>Giving &quot;first aid&quot; assistance</td>
<td>38</td>
</tr>
<tr>
<td>100</td>
<td>Worker in Y.M.C.A., K. of C., etc.</td>
<td>37</td>
</tr>
</tbody>
</table>
Table 5 lists the items most responsible for defining factor 1. "Art" seems to be an obvious name for this factor in view of the high loadings for items 5, 104, and 84. The other items are consistent with this label. Most of the items which have loadings on factor 1 also have substantial loadings on sub-general factor B.

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Artist</td>
<td>58</td>
</tr>
<tr>
<td>104</td>
<td>Art</td>
<td>52</td>
</tr>
<tr>
<td>84</td>
<td>Sculptor</td>
<td>41</td>
</tr>
<tr>
<td>43</td>
<td>Interior decorator</td>
<td>33</td>
</tr>
<tr>
<td>163</td>
<td>Art galleries</td>
<td>31</td>
</tr>
<tr>
<td>194</td>
<td>Decorating a room with flowers</td>
<td>30</td>
</tr>
<tr>
<td>20</td>
<td>Cartoonist</td>
<td>30</td>
</tr>
<tr>
<td>286</td>
<td>Create a new artistic effect, i.e., improve the beauty of the auto</td>
<td>28</td>
</tr>
<tr>
<td>3</td>
<td>Architect</td>
<td>26</td>
</tr>
<tr>
<td>30</td>
<td>Draftsman</td>
<td>25</td>
</tr>
<tr>
<td>122</td>
<td>Mechanical drawing</td>
<td>25</td>
</tr>
<tr>
<td>233</td>
<td>Looking at a collection of antique furniture</td>
<td>21</td>
</tr>
</tbody>
</table>
The items which define factor 2 are shown in Table 6. The high loadings for items 100 and 89 as well as the content of the items with smaller loadings helping others or altruism. "Social welfare and service" is suggested as a name for this factor.

Table 6. Group factor 2

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Worker in Y.M.C.A., K. of C., etc.</td>
<td>66</td>
</tr>
<tr>
<td>89</td>
<td>Social worker</td>
<td>49</td>
</tr>
<tr>
<td>7</td>
<td>Athletic director</td>
<td>43</td>
</tr>
<tr>
<td>70</td>
<td>Playground director</td>
<td>39</td>
</tr>
<tr>
<td>289</td>
<td>Teach others the use of the machine</td>
<td>29</td>
</tr>
<tr>
<td>26</td>
<td>Clergyman</td>
<td>29</td>
</tr>
<tr>
<td>184</td>
<td>Social problem movies</td>
<td>27</td>
</tr>
<tr>
<td>229</td>
<td>Raising money for a charity</td>
<td>26</td>
</tr>
<tr>
<td>202</td>
<td>Teaching children</td>
<td>21</td>
</tr>
<tr>
<td>25</td>
<td>Civil service employee</td>
<td>21</td>
</tr>
<tr>
<td>92</td>
<td>Stock broker</td>
<td>-21</td>
</tr>
</tbody>
</table>
Table 7 lists the items which define factor 3. The items with the highest loadings (items 199 and 131) deal with public speaking. Examination of the other items with positive loadings shows that they are concerned with public appearance and working with people. Items with negative loadings are concerned with activities in which there is likely to be little contact with people. Accordingly, "public contact" was chosen as a descriptive label for factor 3. Some items from factor 3 (e.g. items 206, 201, and 209) which suggest persuasion of others also have moderately high loadings on sub-general factor C.

Table 7. Group factor 3

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>199</td>
<td>Making a speech</td>
<td>58</td>
</tr>
<tr>
<td>131</td>
<td>Public speaking</td>
<td>53</td>
</tr>
<tr>
<td>206</td>
<td>Meeting and directing people</td>
<td>38</td>
</tr>
<tr>
<td>349</td>
<td>Listening to a story</td>
<td>-38</td>
</tr>
<tr>
<td>361</td>
<td>Usually start activities of my group</td>
<td>37</td>
</tr>
<tr>
<td>290</td>
<td>Interest the public in the machine through public address</td>
<td>36</td>
</tr>
<tr>
<td>201</td>
<td>Opening conversation with a stranger</td>
<td>36</td>
</tr>
<tr>
<td>110</td>
<td>Dramatics</td>
<td>35</td>
</tr>
<tr>
<td>200</td>
<td>Organizing a play</td>
<td>34</td>
</tr>
<tr>
<td>209</td>
<td>Adjusting difficulties of others</td>
<td>34</td>
</tr>
<tr>
<td>Item number</td>
<td>Item</td>
<td>Factor loading</td>
</tr>
<tr>
<td>-------------</td>
<td>------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>314</td>
<td>Member of a society or club</td>
<td>-33</td>
</tr>
<tr>
<td>365</td>
<td>Usually liven up the group on a dull day</td>
<td>32</td>
</tr>
<tr>
<td>207</td>
<td>Taking responsibility</td>
<td>31</td>
</tr>
<tr>
<td>1</td>
<td>Actor (not movie)</td>
<td>30</td>
</tr>
<tr>
<td>331</td>
<td>Deal with things</td>
<td>-30</td>
</tr>
<tr>
<td>363</td>
<td>Win friends easily</td>
<td>28</td>
</tr>
<tr>
<td>221</td>
<td>Expressing judgments publicly regardless of criticism</td>
<td>27</td>
</tr>
<tr>
<td>203</td>
<td>Teaching adults</td>
<td>27</td>
</tr>
<tr>
<td>382</td>
<td>Put drive into the organization</td>
<td>26</td>
</tr>
<tr>
<td>311</td>
<td>President of a society or club</td>
<td>26</td>
</tr>
<tr>
<td>383</td>
<td>Stimulate the ambition of my associates</td>
<td>26</td>
</tr>
<tr>
<td>159</td>
<td>Full-dress affairs</td>
<td>25</td>
</tr>
<tr>
<td>195</td>
<td>Arguments</td>
<td>25</td>
</tr>
<tr>
<td>364</td>
<td>Usually get other people to do what I want done</td>
<td>25</td>
</tr>
<tr>
<td>386</td>
<td>Smooth out tangles and disagreements between people</td>
<td>25</td>
</tr>
<tr>
<td>51</td>
<td>Lawyer, criminal</td>
<td>25</td>
</tr>
<tr>
<td>313</td>
<td>Treasurer of a society or club</td>
<td>-25</td>
</tr>
<tr>
<td>48</td>
<td>Labor arbitrator</td>
<td>24</td>
</tr>
<tr>
<td>292</td>
<td>Steadiness and permanence of work</td>
<td>-23</td>
</tr>
<tr>
<td>348</td>
<td>Present a report in writing</td>
<td>-22</td>
</tr>
<tr>
<td>21</td>
<td>Cashier in bank</td>
<td>-22</td>
</tr>
</tbody>
</table>
Table 7. (Continued)

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>198</td>
<td>Interviewing clients</td>
<td>22</td>
</tr>
<tr>
<td>398</td>
<td>My advice sought by many</td>
<td>22</td>
</tr>
<tr>
<td>225</td>
<td>Continually changing activities</td>
<td>21</td>
</tr>
<tr>
<td>41</td>
<td>Governor of a state</td>
<td>21</td>
</tr>
<tr>
<td>67</td>
<td>Pharmacist</td>
<td>-21</td>
</tr>
<tr>
<td>50</td>
<td>Landscape gardener</td>
<td>-21</td>
</tr>
<tr>
<td>369</td>
<td>Have more than my share of novel ideas</td>
<td>20</td>
</tr>
<tr>
<td>334</td>
<td>Taking a chance</td>
<td>20</td>
</tr>
<tr>
<td>255</td>
<td>Foreigners</td>
<td>20</td>
</tr>
<tr>
<td>99</td>
<td>Wholesaler</td>
<td>-20</td>
</tr>
</tbody>
</table>

Table 8 lists the items which define factor 4. "Writer" seems to be the obvious name for this factor. All of the items in Table 8 also have loadings on sub-general factor B.

The items responsible for defining factor 5 are shown in Table 9. The name "military" was chosen for this factor on the basis of the high loadings of items 210, 123, 151, and 4. The items with smaller loadings are not clearly consistent with this name and the term "psychopathic" has been suggested as being more descriptive of the overall content of factor 5. The items with sizeable loadings on factor 5 have no
Table 8. Group factor 4

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>57</td>
<td>Magazine writer</td>
<td>51</td>
</tr>
<tr>
<td>9</td>
<td>Author of novel</td>
<td>35</td>
</tr>
<tr>
<td>40</td>
<td>Foreign correspondent</td>
<td>28</td>
</tr>
<tr>
<td>31</td>
<td>Editor</td>
<td>27</td>
</tr>
<tr>
<td>288</td>
<td>Prepare the advertising for the machine</td>
<td>21</td>
</tr>
<tr>
<td>53</td>
<td>Librarian</td>
<td>18</td>
</tr>
<tr>
<td>112</td>
<td>English composition</td>
<td>18</td>
</tr>
</tbody>
</table>

Table 9. Group factor 5

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>210</td>
<td>Drilling soldiers</td>
<td>82</td>
</tr>
<tr>
<td>123</td>
<td>Military drill</td>
<td>76</td>
</tr>
<tr>
<td>151</td>
<td>Drilling in a company</td>
<td>71</td>
</tr>
<tr>
<td>4</td>
<td>Army officer</td>
<td>53</td>
</tr>
<tr>
<td>211</td>
<td>Pursuing bandits in sheriff's posse</td>
<td>29</td>
</tr>
<tr>
<td>345</td>
<td>Physical activity</td>
<td>29</td>
</tr>
<tr>
<td>14</td>
<td>Aviator</td>
<td>27</td>
</tr>
<tr>
<td>127</td>
<td>Physical training</td>
<td>26</td>
</tr>
<tr>
<td>12</td>
<td>Auto racer</td>
<td>20</td>
</tr>
<tr>
<td>139</td>
<td>Hunting</td>
<td>20</td>
</tr>
<tr>
<td>143</td>
<td>Boxing</td>
<td>20</td>
</tr>
</tbody>
</table>
substantial loadings on any of the four sub-general factors.

Table 10 lists the items which define factor 6. The name "farming" was chosen for this factor primarily on the basis of the high loadings for items 37, 193, 102, and 50. The other items with loadings on factor 6 seem consistent with this label. The items in Table 10 show no consistent pattern in their loadings on the four sub-general factors. Most such loadings for these items are relatively small. An exception is item 102 which has a loading of .43 on factor D.

Table 10. Group factor 6

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>Farmer</td>
<td>52</td>
</tr>
<tr>
<td>193</td>
<td>Raising flowers and vegetables</td>
<td>47</td>
</tr>
<tr>
<td>50</td>
<td>Landscape gardener</td>
<td>43</td>
</tr>
<tr>
<td>102</td>
<td>Agriculture</td>
<td>43</td>
</tr>
<tr>
<td>326</td>
<td>House-to-house canvassing</td>
<td>-33</td>
</tr>
<tr>
<td>19</td>
<td>Carpenter</td>
<td>26</td>
</tr>
<tr>
<td>230</td>
<td>Living in the city</td>
<td>-24</td>
</tr>
<tr>
<td>194</td>
<td>Decorating a room with flowers</td>
<td>23</td>
</tr>
<tr>
<td>191</td>
<td>Handling horses</td>
<td>22</td>
</tr>
<tr>
<td>342</td>
<td>Outside work</td>
<td>20</td>
</tr>
</tbody>
</table>
Table 11 lists the items responsible for defining factor 7. The highest loading on this factor is only .29. Nearly all of the items shown have higher loadings on sub-general factor D. Factor 7 is the only group factor defining factor D. The name "natural and social science" seems to describe the content of the factor fairly well.

Table 11. Group factor 7

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>114</td>
<td>Geology</td>
<td>29</td>
</tr>
<tr>
<td>106</td>
<td>Botany</td>
<td>29</td>
</tr>
<tr>
<td>129</td>
<td>Psychology</td>
<td>29</td>
</tr>
<tr>
<td>136</td>
<td>Zoology</td>
<td>29</td>
</tr>
<tr>
<td>125</td>
<td>Nature study</td>
<td>26</td>
</tr>
<tr>
<td>126</td>
<td>Philosophy</td>
<td>23</td>
</tr>
<tr>
<td>128</td>
<td>Physics</td>
<td>23</td>
</tr>
<tr>
<td>133</td>
<td>Sociology</td>
<td>21</td>
</tr>
<tr>
<td>147</td>
<td>Observing birds (nature study)</td>
<td>19</td>
</tr>
<tr>
<td>130</td>
<td>Physiology</td>
<td>18</td>
</tr>
</tbody>
</table>
The items responsible for defining factor 8 are shown in Table 12. The interpretation of factor 8 seems clear. The content of the items is best summarized by the term "mechanical". Every item in Table 12 has a substantial loading on sub-general factor A.

Table 12. Group factor 8

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>187</td>
<td>Adjusting a carburetor</td>
<td>51</td>
</tr>
<tr>
<td>188</td>
<td>Repairing electrical wiring</td>
<td>51</td>
</tr>
<tr>
<td>186</td>
<td>Repairing a clock</td>
<td>48</td>
</tr>
<tr>
<td>190</td>
<td>Operating machinery</td>
<td>48</td>
</tr>
<tr>
<td>189</td>
<td>Cabinetmaking</td>
<td>47</td>
</tr>
<tr>
<td>13</td>
<td>Auto repairman</td>
<td>46</td>
</tr>
<tr>
<td>56</td>
<td>Machinist</td>
<td>43</td>
</tr>
<tr>
<td>132</td>
<td>Shop work</td>
<td>43</td>
</tr>
<tr>
<td>94</td>
<td>Toolmaker</td>
<td>42</td>
</tr>
<tr>
<td>121</td>
<td>Manual training</td>
<td>38</td>
</tr>
<tr>
<td>368</td>
<td>Have mechanical ingenuity (inventiveness)</td>
<td>37</td>
</tr>
<tr>
<td>19</td>
<td>Carpenter</td>
<td>35</td>
</tr>
<tr>
<td>212</td>
<td>Doing research work</td>
<td>-31</td>
</tr>
<tr>
<td>98</td>
<td>Watchmaker</td>
<td>29</td>
</tr>
<tr>
<td>185</td>
<td>Making a radio set</td>
<td>29</td>
</tr>
<tr>
<td>122</td>
<td>Mechanical drawing</td>
<td>28</td>
</tr>
</tbody>
</table>
Table 12. (Continued)

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>88</td>
<td>Shop foreman</td>
<td>27</td>
</tr>
<tr>
<td>180</td>
<td>&quot;Popular Mechanics&quot;</td>
<td>26</td>
</tr>
<tr>
<td>55</td>
<td>Locomotive engineer</td>
<td>25</td>
</tr>
<tr>
<td>30</td>
<td>Draftsman</td>
<td>21</td>
</tr>
<tr>
<td>12</td>
<td>Auto racer</td>
<td>21</td>
</tr>
</tbody>
</table>

Group factor 9 was not sufficiently well defined to permit interpretation. Only three items had loadings over .20 and each of these items had loadings over .64 on sub-general factor A. The items are listed in Table 13.

Table 13. Group factor 9

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>Chemist</td>
<td>33</td>
</tr>
<tr>
<td>108</td>
<td>Chemistry</td>
<td>24</td>
</tr>
<tr>
<td>24</td>
<td>Civil engineer</td>
<td>21</td>
</tr>
</tbody>
</table>
Table 14 lists the items responsible for defining factor 10. Factor 10 is best described as a "medical" factor with high loadings from items 93, 69, and 29. The items in Table 14 show no consistent pattern in their loadings on the four sub-general factors.

Table 14. Group factor 10

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>93</td>
<td>Surgeon</td>
<td>66</td>
</tr>
<tr>
<td>69</td>
<td>Physician</td>
<td>53</td>
</tr>
<tr>
<td>29</td>
<td>Dentist</td>
<td>50</td>
</tr>
<tr>
<td>67</td>
<td>Pharmacist</td>
<td>28</td>
</tr>
<tr>
<td>192</td>
<td>Giving &quot;first aid&quot; assistance</td>
<td>27</td>
</tr>
<tr>
<td>97</td>
<td>Undertaker</td>
<td>25</td>
</tr>
<tr>
<td>297</td>
<td>Opportunity to understand just how one's superior expects work to be done</td>
<td>24</td>
</tr>
<tr>
<td>107</td>
<td>Calculus</td>
<td>-23</td>
</tr>
<tr>
<td>114</td>
<td>Geology</td>
<td>-22</td>
</tr>
<tr>
<td>234</td>
<td>Progressive people</td>
<td>-28</td>
</tr>
<tr>
<td>111</td>
<td>Economics</td>
<td>-23</td>
</tr>
<tr>
<td>376</td>
<td>Able to meet emergencies quickly and effectively</td>
<td>21</td>
</tr>
</tbody>
</table>
The items responsible for defining factor 11 are shown in Table 15. The interpretation of this factor is clear. The obvious label is "mathematics". All of the mathematics items have loadings on sub-general factor A.

Table 15. Group factor 11

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Algebra</td>
<td>67</td>
</tr>
<tr>
<td>120</td>
<td>Mathematics</td>
<td>65</td>
</tr>
<tr>
<td>103</td>
<td>Arithmetic</td>
<td>60</td>
</tr>
<tr>
<td>115</td>
<td>Geometry</td>
<td>46</td>
</tr>
<tr>
<td>107</td>
<td>Calculus</td>
<td>27</td>
</tr>
<tr>
<td>105</td>
<td>Bookkeeping</td>
<td>21</td>
</tr>
</tbody>
</table>

The items with loadings on factor 12 are listed in Table 16. The name "business management" seems to describe the content of this factor. All of the items which have loadings on factor 12 also have loadings on sub-general factor C.

Table 17 lists the items responsible for defining factor 13. All of the items with loadings on this factor are concerned with sales activities. Accordingly, factor 13 was named "sales". All of the items with positive loadings on factor 13 also have loadings on sub-general factor C.
Table 16. Group factor 12

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>219</td>
<td>Buying merchandise for a store</td>
<td>40</td>
</tr>
<tr>
<td>18</td>
<td>Buyer of merchandise</td>
<td>40</td>
</tr>
<tr>
<td>99</td>
<td>Wholesaler</td>
<td>32</td>
</tr>
<tr>
<td>65</td>
<td>Office manager</td>
<td>31</td>
</tr>
<tr>
<td>35</td>
<td>Factory manager</td>
<td>30</td>
</tr>
<tr>
<td>21</td>
<td>Cashier in bank</td>
<td>27</td>
</tr>
<tr>
<td>217</td>
<td>Bargaining (swapping)</td>
<td>26</td>
</tr>
<tr>
<td>58</td>
<td>Manufacturer</td>
<td>26</td>
</tr>
<tr>
<td>220</td>
<td>Displaying merchandise in a store</td>
<td>24</td>
</tr>
<tr>
<td>33</td>
<td>Employment manager</td>
<td>24</td>
</tr>
<tr>
<td>226</td>
<td>Developing business systems</td>
<td>22</td>
</tr>
<tr>
<td>347</td>
<td>Technical responsibility (25 people) vs. supervisory responsibility (300 people)</td>
<td>-22</td>
</tr>
</tbody>
</table>

The interpretation of group factor 13 is somewhat modified by the appearance of another sales factor in the residual table. This "residual factor" involves items which seem to be concerned with "personal contact sales" rather than the impersonal sale of products which is more descriptive of group factor 13.
Table 17. Group factor 13

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>54</td>
<td>Life insurance salesman</td>
<td>47</td>
</tr>
<tr>
<td>90</td>
<td>Specialty salesman</td>
<td>45</td>
</tr>
<tr>
<td>287</td>
<td>Sell the machine</td>
<td>43</td>
</tr>
<tr>
<td>95</td>
<td>Traveling salesman</td>
<td>42</td>
</tr>
<tr>
<td>11</td>
<td>Auto salesman</td>
<td>39</td>
</tr>
<tr>
<td>197</td>
<td>Interviewing prospects in selling</td>
<td>31</td>
</tr>
<tr>
<td>320</td>
<td>Chairman, publicity committee</td>
<td>21</td>
</tr>
<tr>
<td>335</td>
<td>Definite salary vs. commission on what is done</td>
<td>-29</td>
</tr>
</tbody>
</table>

The items defining factor 14 are listed in Table 18. The factor is defined by items 66, 63, and 62. The factor was named "musician". All of the items with loadings on factor 14 also have loadings on sub-general factor B.

Table 18. Group factor 14

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>66</td>
<td>Orchestra conductor</td>
<td>74</td>
</tr>
<tr>
<td>63</td>
<td>Music teacher</td>
<td>74</td>
</tr>
<tr>
<td>62</td>
<td>Musician</td>
<td>56</td>
</tr>
<tr>
<td>41</td>
<td>Governor of a state</td>
<td>-32</td>
</tr>
<tr>
<td>167</td>
<td>Symphony concert</td>
<td>20</td>
</tr>
<tr>
<td>27</td>
<td>College professor</td>
<td>20</td>
</tr>
</tbody>
</table>
Table 19 lists the items most responsible for defining factor 15. The factor seems to be clearly defined and was named "law". The items with loadings on factor 15 are factorially complex. All have loadings on both sub-general factors B and C and three items (51, 48, and 41) have loadings on factor 3.

Table 19. Group factor 15

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>52</td>
<td>Lawyer, corporation</td>
<td>45</td>
</tr>
<tr>
<td>51</td>
<td>Lawyer, criminal</td>
<td>35</td>
</tr>
<tr>
<td>47</td>
<td>Judge</td>
<td>33</td>
</tr>
<tr>
<td>48</td>
<td>Labor arbitrator</td>
<td>29</td>
</tr>
<tr>
<td>41</td>
<td>Governor of a state</td>
<td>26</td>
</tr>
</tbody>
</table>

Residuals

Table 20 shows a frequency distribution of the residuals. Only eleven residuals were greater than .35.

Table 21 presents the item pairs involved in the eleven largest residuals, the correlations for each pair, and their residuals.
Table 20. Frequency distribution of residuals\textsuperscript{a}

<table>
<thead>
<tr>
<th>Residual</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>61 - 65</td>
<td>1</td>
</tr>
<tr>
<td>56 - 60</td>
<td></td>
</tr>
<tr>
<td>51 - 55</td>
<td>1</td>
</tr>
<tr>
<td>46 - 50</td>
<td>2</td>
</tr>
<tr>
<td>41 - 45</td>
<td>2</td>
</tr>
<tr>
<td>36 - 40</td>
<td>5</td>
</tr>
<tr>
<td>31 - 35</td>
<td>5</td>
</tr>
<tr>
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\text{\textit{N = 41,328}}

\textsuperscript{a}Absolute values.
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<th>Residual</th>
<th>Correlation</th>
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<tr>
<td>205</td>
<td>Being called by a nickname</td>
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<tr>
<td>81</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>Reporter, general</td>
<td>49</td>
<td>50</td>
</tr>
<tr>
<td>79</td>
<td>Reporter, sporting page</td>
<td></td>
<td></td>
</tr>
<tr>
<td>77</td>
<td>Real estate salesman</td>
<td>47</td>
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<td>Cashier in bank</td>
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<tr>
<td>382</td>
<td>Put drive into the organization</td>
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<tr>
<td>383</td>
<td>Stimulate the ambition of my associates</td>
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<tr>
<td>336</td>
<td>Work for yourself</td>
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<tr>
<td>338</td>
<td>Work in a large corporation with little chance of becoming president until age of 55</td>
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<td>154</td>
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<tr>
<td>80</td>
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Factor Scales

A group of items with substantial residual intercorrelations was identified from the residual table. These items are listed in Table 22 and the residual correlations among them are presented in Table 23. This is the "personal contact sales" factor which was referred to in the discussion of group factor 13.

Table 22. Related items from residual matrix

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<th>Item number</th>
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<tr>
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Table 23. Residual correlations among five items

<table>
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<th>79</th>
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</tbody>
</table>
Tables 25 through 37 in Appendix B list the items which are relatively pure measures, respectively, of 13 of the 15 group factors. Factor 9 was not sufficiently defined to permit measurement and factor 15 did not have enough pure items to yield measurement.

Table 38 in Appendix B lists the items which are relatively pure measures of the group of items identified from the residual matrix.

Factor Comparisons

As noted above, most factor analyses of interests have used occupational scale scores as variables. Comparisons of a number of these studies have been reported (e.g., Strong, 1943; Guilford et al., 1954; Super and Crites, 1962). A brief comparison of the results of these various studies and the present work seems appropriate.

Darley (1941) has summarized the results of the factor analyses carried out by Thurstone and Strong. Darley's "technical" label would seem to be appropriate for factor A in the present study. His "verbal or linguistic" classification seems to include some of the content of factors 15, 3, and 4. Of these three factors, 4 has loadings on sub-general factor B, but 15 and 3 do not. Darley's "business contact" classification seems to refer to the same sort of interests as represented by factor 13 but his "business detail" has no apparent counterpart in the results of the present study. Darley's "welfare or uplift" seems clearly to be related to factor 2.

Torr's (1952) factor analysis of 49 variables from seven interest
inventories is of interest since he included only one variable from the SVIB, a non-occupational scale. His factor names of "mechanics", "people", "esthetics", "nature", and "business" could serve as labels for factors 8, 2 or 3, B, D, and C respectively. His "science" factor would not be very accurate for any single factor in the present study since items which seem to be concerned with interest in science have loadings on different factors. Items dealing with the natural and social sciences have loadings on factor D while physical science items have loadings on factor A.

It should be recalled that the studies considered above did not have as their aim the classification of interests per se, but rather the classification of occupational groups in terms of common interest patterns. Comparisons such as those made above must necessarily involve assumptions about the way in which the factors from the present study are related to scores on various occupational scales. Since the question of the validity of these assumptions must await further research, the comparisons made above should be regarded as speculative at present.

A more meaningful comparison can be made with the results of the factor analysis carried out by Guilford and his associates (Guilford et al., 1954). No factor corresponding to Guilford's "scientific" factor is apparent in the present study. The present findings indicate that the physical sciences and the natural and social sciences do not have loadings on the same factors. Guilford's "social welfare", "mechanical", and "business" factors have counterparts in factors 2,
8, and C, respectively. His "aesthetic expression" factor seems to correspond with factor B and his "outdoor" label could be applied to factor 6. Guilford's "clerical" and "aesthetic appreciation" factors have no counterparts here. This may be due to the fact that the SVIB does not contain a sufficient number of items of the appropriate types to allow extraction of these factors.

Suggestions for Research

At least two areas for research based on this study seem obvious. Research is presently in progress to compare the success of scores based on the factor scales presented here in differentiating selected occupational groups from men in general with that of the empirical scale scores of the SVIB. It would also be useful to determine the loadings of the new items included in Form T399R on the factors from the present study.

Other possible areas for research include the investigation of the relationships between scores on the factor scales and scores on the factor scales of the SVIB. Comparisons could also be made between scores on the factor scales and scores on scales from other interest measures. It should also be possible and relevant to study the development of interests by observing changes in factor structure across time, occupational level, or some similar variable.

The results of the present study should facilitate efforts toward the development of a theoretical structure in the area of interest measurement.
SUMMARY

The purpose of the present study was to perform a factor analysis of the 288 items which are common to both Form M and Form T399R of the Strong Vocational Interest Blank and to identify those items which could serve as relatively pure measures of the factors.

The responses of 500 men in general to each of the 288 items were intercorrelated and the items arranged in 15 clusters on the basis of their intercorrelations. Thurstone's (1947) multiple group method of factor analysis was followed. One factor was extracted from each cluster and the angular cosines among the 15 oblique factors were obtained. Four factors were extracted from the 15 by 15 matrix of angular cosines using Lawley's (1940) maximum-likelihood procedure. The residuals were reduced to less than .00005.

An oblique rotation of the four factors was performed. Wherry's (1959) hierarchical factor solution was applied to yield four sub-general and 15 group factors. The factor loadings on the 19 factors of each of the 288 SVIB items were computed and a 288 by 288 residual table was obtained.

The items with loadings on each factor were listed and descriptive labels were suggested for each factor. A frequency distribution of residuals was presented and the residuals greater than .35 identified with respect to the items involved. Those items which were chosen as relatively pure measures of 13 of the 15 group factors were listed as were items chosen as measures of a group of related items identified.
from their residuals. Two of the group factors did not yield a sufficient number of pure items to permit measurement.

The labels for the four sub-general factors were: technical, aesthetic, business, and natural science. The group factors with loadings on the technical factor were "mechanical" and "mathematics"; for the aesthetic factor they were "art", "writer", and "musician"; for the business factor they were "business management" and "sales". Only "natural-social science" had loadings on the natural science factor.

The group factors which did not have loadings on any of the sub-general factors were: "social welfare and service", "public contact", "military", "farming", "medical", "lawyer", and "personal contact sales".

The results were discussed and compared to the results of other factor analytic studies of interests. Possibilities for further research were suggested.
LITERATURE CITED


Guilford, J. P., Christensen, P. R., Bond, N. A., Jr., and Sutton, M. A. A factor analytic study of human interests. Psychological monographs, 1954, 68, No. 4 (Whole No. 375).


Moore, B. V. Personnel selection of graduate engineers. Psychological monographs, 1921, 30, (Whole No. 138).


ACKNOWLEDGMENTS

I wish to express my sincere appreciation to those who have been helpful in the preparation of this dissertation. I am especially grateful to Dr. Arthur C. MacKinney, my major professor, for his advice and assistance in the preparation of this dissertation. I am grateful to Dr. Leroy Wolins for his clarification and advice in regard to statistical procedures and for his direction of the data processing. A special thanks is extended to Dr. Wilbur L. Layton for his encouragement and advice. I also wish to thank Dr. Harold W. Davey and Dr. Herbert T. David for their helpful comments and criticisms, and my wife, Jean, for her encouragement, understanding, and material aid in the preparation of this dissertation.
APPENDIX A: FACTOR MATRIX
Table 24. Matrix of factor loadings

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| 76   | -07| -03| 05 | 01 | -04| -01| 04 | 03 | -08| 09 | -08| -02| 01 | 09 | -02| 00 | -03| 08 | -09|
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| 79   | 01 | 00 | -02| 02 | 01 | -02| -01| 01 | 03 | -01| -03| 05 | -03| 07 | 00 | 06 | -09| 01 | -05|
| 80   | -01| 01 | -01| 00 | 00 | -01| 00 | -09| 05 | -05| 06 | -01| -05| 04 | 09 | 01 | -04| 04 | 07|
| 81   | 00 | 00 | -02| 09 | -07| 06 | -07| -03| 03 | -08| 13 | -03| -03| -09| 06 | 06 | -07| 07| 00|
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| 83   | -08| -01| 08 | -07| -01| -04| -09| -01| 01 | 03 | -03| 05 | -08| 03 | 09 | 06 | 02 | 08 | 02|
| 117  | 03 | 17 | -09| 10 | 08 | -06| 13 | -02| 07 | 05 | 07 | -12| 03 | 07 | 03 | -11| 06 | 06 | 04|
| 137  | 06 | 08 | 17 | -01| 06 | 15 | -02| 02 | 07 | -06| -05| -01| 00 | -04| 13 | 07 | 00 | -05| -06|
| 140  | 04 | 09 | 02 | 07 | 05 | 15 | -12| 00 | 03 | -07| 05 | 01 | -03| -09| 05 | 06 | 00 | -01| -01|
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| 146  | 08 | -02| 16 | -02| -03| -04| 09 | 00 | 08 | -01| -02| -05 | 01 | 07 | 16 | 03 | -01| -02| -04|
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| 223  | 18 | 04 | -05| 08 | 10 | -01| -06| 00 | 04 | -02| 01 | 06 | 00 | 02 | 07 | 01 | 05 | 04 | -08|
| 224  | 02 | 01 | 07 | 05 | 05 | 09 | -16| -10| 08 | -03| 08 | 05 | -09| -07| 12 | 13 | -06| -01| 08|
| 227  | 13 | -05| 17 | 04 | -01| 03 | -15| -07| 01 | -06| -01 | 03 | -01| 11 | 04 | 07 | 08 | 04 | 01|
| 241  | 06 | 16 | -09| -06| 08 | -03| -01| -02| 02 | 03 | 01 | 08 | -05| 06 | 09 | -06| 04 | 04 | 14|
| 247  | 14 | -08| 17 | 11 | -02| 06 | -17| -07| 03 | 06 | 01 | 05 | -02| 01 | 08 | 02 | 15 | -01| 05|
| 251  | 13 | 09 | -12| -03| 06 | -07| 09 | 08 | -05| 11 | -08| 00 | 07 | 07 | -04| -08| 00 | -05| -02|
| 272  | 14 | 17 | -10| 03 | 01 | 02 | 09 | 04 | -11| 01 | 02 | -03 | 06 | 00 | 02 | -08| 02 | 05 | 02|
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APPENDIX B: FACTOR SCALES
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<tr>
<td>89</td>
<td>Social worker</td>
<td>+1</td>
</tr>
<tr>
<td>7</td>
<td>Athletic director</td>
<td>+1</td>
</tr>
<tr>
<td>70</td>
<td>Playground director</td>
<td>+1</td>
</tr>
<tr>
<td>289</td>
<td>Teach others the use of the machine</td>
<td>+1</td>
</tr>
<tr>
<td>26</td>
<td>Clergyman</td>
<td>+1</td>
</tr>
<tr>
<td>184</td>
<td>Social problem movies</td>
<td>+1</td>
</tr>
<tr>
<td>229</td>
<td>Raising money for a charity</td>
<td>+1</td>
</tr>
<tr>
<td>202</td>
<td>Teaching children</td>
<td>+1</td>
</tr>
<tr>
<td>25</td>
<td>Civil service employee</td>
<td>+1</td>
</tr>
<tr>
<td>92</td>
<td>Stock broker</td>
<td>-1</td>
</tr>
</tbody>
</table>
Table 27. Items for measurement of factor 3

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>199</td>
<td>Making a speech</td>
<td>+1</td>
</tr>
<tr>
<td>131</td>
<td>Public speaking</td>
<td>+1</td>
</tr>
<tr>
<td>206</td>
<td>Meeting and directing people</td>
<td>+1</td>
</tr>
<tr>
<td>349</td>
<td>Listening to a story</td>
<td>-1</td>
</tr>
<tr>
<td>361</td>
<td>Usually start activities of my group</td>
<td>+1</td>
</tr>
<tr>
<td>290</td>
<td>Interest the public in the machine through public address</td>
<td>+1</td>
</tr>
<tr>
<td>201</td>
<td>Opening conversation with a stranger</td>
<td>+1</td>
</tr>
<tr>
<td>110</td>
<td>Dramatics</td>
<td>+1</td>
</tr>
<tr>
<td>200</td>
<td>Organizing a play</td>
<td>+1</td>
</tr>
<tr>
<td>209</td>
<td>Adjusting difficulties of others</td>
<td>+1</td>
</tr>
<tr>
<td>314</td>
<td>Member of a society or club</td>
<td>-1</td>
</tr>
<tr>
<td>365</td>
<td>Usually liven up the group on a dull day</td>
<td>+1</td>
</tr>
<tr>
<td>207</td>
<td>Taking responsibility</td>
<td>+1</td>
</tr>
<tr>
<td>1</td>
<td>Actor (not movie)</td>
<td>+1</td>
</tr>
<tr>
<td>331</td>
<td>Deal with things</td>
<td>-1</td>
</tr>
<tr>
<td>363</td>
<td>Win friends easily</td>
<td>+1</td>
</tr>
<tr>
<td>221</td>
<td>Expressing judgments publicly regardless of criticism</td>
<td>+1</td>
</tr>
<tr>
<td>203</td>
<td>Teaching adults</td>
<td>+1</td>
</tr>
<tr>
<td>382</td>
<td>Put drive into the organization</td>
<td>+1</td>
</tr>
<tr>
<td>311</td>
<td>President of a society or club</td>
<td>+1</td>
</tr>
<tr>
<td>383</td>
<td>Stimulate the ambition of my associates</td>
<td>+1</td>
</tr>
<tr>
<td>159</td>
<td>Full-dress affairs</td>
<td>+1</td>
</tr>
</tbody>
</table>
Table 27. (Continued)

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>195</td>
<td>Arguments</td>
<td>+1</td>
</tr>
<tr>
<td>364</td>
<td>Usually get other people to do what I want done</td>
<td>+1</td>
</tr>
<tr>
<td>386</td>
<td>Smooth out tangles and disagreements between people</td>
<td>+1</td>
</tr>
<tr>
<td>313</td>
<td>Treasurer of a society or club</td>
<td>-1</td>
</tr>
<tr>
<td>48</td>
<td>Labor arbitrator</td>
<td>+1</td>
</tr>
<tr>
<td>292</td>
<td>Steadiness and permanence of work</td>
<td>-1</td>
</tr>
<tr>
<td>348</td>
<td>Present a report in writing</td>
<td>-1</td>
</tr>
<tr>
<td>198</td>
<td>Interviewing clients</td>
<td>+1</td>
</tr>
<tr>
<td>398</td>
<td>My advice sought by many</td>
<td>+1</td>
</tr>
</tbody>
</table>

Table 28. Items for measurement of factor 4

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>57</td>
<td>Magazine writer</td>
<td>+1</td>
</tr>
<tr>
<td>9</td>
<td>Author of novel</td>
<td>+1</td>
</tr>
<tr>
<td>40</td>
<td>Foreign correspondent</td>
<td>+1</td>
</tr>
<tr>
<td>31</td>
<td>Editor</td>
<td>+1</td>
</tr>
<tr>
<td>288</td>
<td>Prepare the advertising for the machine</td>
<td>+1</td>
</tr>
<tr>
<td>53</td>
<td>Librarian</td>
<td>+1</td>
</tr>
<tr>
<td>112</td>
<td>English composition</td>
<td>+1</td>
</tr>
</tbody>
</table>
Table 29. Items for measurement of factor 5

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>210</td>
<td>Drilling soldiers</td>
<td>+1</td>
</tr>
<tr>
<td>123</td>
<td>Military drill</td>
<td>+1</td>
</tr>
<tr>
<td>151</td>
<td>Drilling in a company</td>
<td>+1</td>
</tr>
<tr>
<td>4</td>
<td>Army officer</td>
<td>+1</td>
</tr>
</tbody>
</table>

Table 30. Items for measurement of factor 6

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>Farmer</td>
<td>+1</td>
</tr>
<tr>
<td>193</td>
<td>Raising flowers and vegetables</td>
<td>+1</td>
</tr>
<tr>
<td>50</td>
<td>Landscape gardener</td>
<td>+1</td>
</tr>
<tr>
<td>102</td>
<td>Agriculture</td>
<td>+1</td>
</tr>
<tr>
<td>326</td>
<td>House-to-house canvassing</td>
<td>-1</td>
</tr>
<tr>
<td>230</td>
<td>Living in the city</td>
<td>-1</td>
</tr>
</tbody>
</table>
Table 31. Items for measurement of factor 7

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>114</td>
<td>Geology</td>
<td>+1</td>
</tr>
<tr>
<td>106</td>
<td>Botany</td>
<td>+1</td>
</tr>
<tr>
<td>129</td>
<td>Psychology</td>
<td>+1</td>
</tr>
<tr>
<td>136</td>
<td>Zoology</td>
<td>+1</td>
</tr>
<tr>
<td>125</td>
<td>Nature study</td>
<td>+1</td>
</tr>
<tr>
<td>126</td>
<td>Philosophy</td>
<td>+1</td>
</tr>
<tr>
<td>133</td>
<td>Sociology</td>
<td>+1</td>
</tr>
<tr>
<td>147</td>
<td>Observing birds (nature study)</td>
<td>+1</td>
</tr>
<tr>
<td>130</td>
<td>Physiology</td>
<td>+1</td>
</tr>
</tbody>
</table>

Table 32. Items for measurement of factor 8

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>187</td>
<td>Adjusting a carburetor</td>
<td>+1</td>
</tr>
<tr>
<td>188</td>
<td>Repairing electrical wiring</td>
<td>+1</td>
</tr>
<tr>
<td>186</td>
<td>Repairing a clock</td>
<td>+1</td>
</tr>
<tr>
<td>190</td>
<td>Operating machinery</td>
<td>+1</td>
</tr>
<tr>
<td>189</td>
<td>Cabinetmaking</td>
<td>+1</td>
</tr>
<tr>
<td>13</td>
<td>Auto repairman</td>
<td>+1</td>
</tr>
<tr>
<td>56</td>
<td>Machinist</td>
<td>+1</td>
</tr>
<tr>
<td>132</td>
<td>Shop work</td>
<td>+1</td>
</tr>
</tbody>
</table>
Table 32. (Continued)

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>94</td>
<td>Toolmaker</td>
<td>+1</td>
</tr>
<tr>
<td>121</td>
<td>Manual training</td>
<td>+1</td>
</tr>
<tr>
<td>368</td>
<td>Have mechanical ingenuity (inventiveness)</td>
<td>+1</td>
</tr>
<tr>
<td>19</td>
<td>Carpenter</td>
<td>+1</td>
</tr>
<tr>
<td>212</td>
<td>Doing research work</td>
<td>-1</td>
</tr>
<tr>
<td>98</td>
<td>Watchmaker</td>
<td>+1</td>
</tr>
<tr>
<td>185</td>
<td>Making a radio set</td>
<td>+1</td>
</tr>
<tr>
<td>88</td>
<td>Shop foreman</td>
<td>+1</td>
</tr>
<tr>
<td>180</td>
<td>&quot;Popular Mechanics&quot;</td>
<td>+1</td>
</tr>
<tr>
<td>55</td>
<td>Locomotive engineer</td>
<td>+1</td>
</tr>
</tbody>
</table>

Table 33. Items for measurement of factor 10

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>93</td>
<td>Surgeon</td>
<td>+1</td>
</tr>
<tr>
<td>69</td>
<td>Physician</td>
<td>+1</td>
</tr>
<tr>
<td>29</td>
<td>Dentist</td>
<td>+1</td>
</tr>
<tr>
<td>189</td>
<td>Progressive people</td>
<td>-1</td>
</tr>
<tr>
<td>192</td>
<td>Giving &quot;first aid&quot; assistance</td>
<td>+1</td>
</tr>
<tr>
<td>97</td>
<td>Undertaker</td>
<td>+1</td>
</tr>
<tr>
<td>297</td>
<td>Opportunity to understand just how one's superior expects work to be done</td>
<td>+1</td>
</tr>
</tbody>
</table>
Table 34. Items for measurement of factor 11

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Algebra</td>
<td>+1</td>
</tr>
<tr>
<td>120</td>
<td>Mathematics</td>
<td>+1</td>
</tr>
<tr>
<td>103</td>
<td>Arithmetic</td>
<td>+1</td>
</tr>
<tr>
<td>115</td>
<td>Geometry</td>
<td>+1</td>
</tr>
</tbody>
</table>

Table 35. Items for measurement of factor 12

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>219</td>
<td>Buying merchandise for a store</td>
<td>+1</td>
</tr>
<tr>
<td>18</td>
<td>Buyer of merchandise</td>
<td>+1</td>
</tr>
<tr>
<td>65</td>
<td>Office manager</td>
<td>+1</td>
</tr>
<tr>
<td>35</td>
<td>Factory manager</td>
<td>+1</td>
</tr>
<tr>
<td>217</td>
<td>Bargaining (swapping)</td>
<td>+1</td>
</tr>
<tr>
<td>58</td>
<td>Manufacturer</td>
<td>+1</td>
</tr>
<tr>
<td>33</td>
<td>Employment manager</td>
<td>+1</td>
</tr>
<tr>
<td>226</td>
<td>Developing business systems</td>
<td>+1</td>
</tr>
<tr>
<td>347</td>
<td>Technical responsibility (25 people) vs.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>supervisory responsibility (300 people)</td>
<td>-1</td>
</tr>
</tbody>
</table>
Table 36. Items for measurement of factor 13

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>54</td>
<td>Life insurance salesman</td>
<td>+1</td>
</tr>
<tr>
<td>90</td>
<td>Specialty salesman</td>
<td>+1</td>
</tr>
<tr>
<td>287</td>
<td>Sell the machine</td>
<td>+1</td>
</tr>
<tr>
<td>95</td>
<td>Traveling salesman</td>
<td>+1</td>
</tr>
<tr>
<td>11</td>
<td>Auto salesman</td>
<td>+1</td>
</tr>
<tr>
<td>197</td>
<td>Interviewing prospects in selling</td>
<td>+1</td>
</tr>
</tbody>
</table>

Table 37. Items for measurement of factor 14

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>66</td>
<td>Orchestra conductor</td>
<td>+1</td>
</tr>
<tr>
<td>63</td>
<td>Music teacher</td>
<td>+1</td>
</tr>
<tr>
<td>62</td>
<td>Musician</td>
<td>+1</td>
</tr>
</tbody>
</table>
Table 38. Items for measurement of residual group

<table>
<thead>
<tr>
<th>Item number</th>
<th>Item</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>77</td>
<td>Real estate salesman</td>
<td>+1</td>
</tr>
<tr>
<td>78</td>
<td>Reporter, general</td>
<td>+1</td>
</tr>
<tr>
<td>79</td>
<td>Reporter, sporting page</td>
<td>+1</td>
</tr>
<tr>
<td>80</td>
<td>Retailer</td>
<td>+1</td>
</tr>
<tr>
<td>81</td>
<td>Sales manager</td>
<td>+1</td>
</tr>
</tbody>
</table>