

The Perceived Dimensions of Jobs:
A Multidimensional Scaling Approach

by

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(ABSTRACT)

Recent research has revealed ambiguous evidence for the validity of the cognitive complexity (CC) construct. Some authors (Bieri, Atkins, Briar, Leaman, Miller, & Tripodi, 1966; Scott, Osgood, & Peterson, 1979) have suggested that a potentially useful method for examining CC is multidimensional scaling. The present study examined such an operational definition. The present study also examined the perceptual dimensions that underlie individuals' perceptions of jobs.

Three hundred and five subjects rated the similarity of pairs of job titles, completed the Role Construct Repertory Test (REP), and later rated videotaped vignettes in a performance appraisal simulation. Multidimensional scaling extracted the subjects' dimensionality. Due to an unstable solution, the study's first three hypotheses (that dimensionality would predict rater accuracy, that dimensionality would predict rater accuracy better than the traditional Role Construct Repertory test, and that dimensionality and the REP would be correlated) were untestable. Multidimensional scaling was not a useful approach in this context.

The fourth hypothesis stated that the present data would replicate the three-dimensional job characteristics model of Stone and Gueutal (1985). Results indicated that the Stone and Gueutal configuration was not supported. Thus, job design efforts predicated on their model appear premature.

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INTRODUCTION

OVERVIEW

During the 1960's and 1970's, cognitive complexity (CC) was considered a variable of importance in the study of stimulus perception and social relations. More recently, the construct has fallen victim to benign neglect at best or to disrepute at worst. In short, it seems that Foa and Turner's (1970) prophecy of an increased focus on cognitive structures by the year 2000 may not be accurate in the case of CC. The literature reveals both an explanation for this turn of events and yet a possible justification for the reexamination of the cognitive complexity construct.

A reexamination of CC is potentially important for research in work settings. For example, if raters' cognitive capacities constrain the manner in which they perceive stimuli, the potential importance of CC in work settings cannot be overstated. Such workplace endeavors as job design, job analysis, job evaluation, and performance appraisal may all be susceptible to the effects of individuals' cognitive complexity. Accordingly, another look at cognitive complexity is undertaken here.

First, this dissertation defines the CC construct. Second, several methods of operationalizing CC are described and evaluated. Third, the present paper suggests a number of contexts in which a new look at CC may make a contribution in work settings. Fourth, one potentially useful method for operationalizing CC is proposed. This methodology permits the measurement of not only cognitive complexity but also its convergent and

predictive validity. Fifth, the present study attempts to replicate the underlying job dimensions of Stone and Gueutal (1985). Finally, the implications and limitations of the present study are discussed.

DEFINING COGNITIVE COMPLEXITY

Human information processing involves two distinct classes of information: content and structure (Schroder, Driver, & Streufert, 1967). Content variables provide information concerning the nature, magnitude, and duration of to-be-remembered stimuli, whereas structural variables concern the manner in which people process stimuli. The existence of structural variables has numerous implications for the study of individual differences in stimulus perception. Cognitive complexity (Bieri, 1955; Kelly, 1955, 1970) has been proposed as one such structuring variable.

Derived from Lewin's (1936) notion of differentiation and from Kelly's (1955) personal construct theory, cognitive complexity was originally conceived in terms of an individual's capacity to differentiate stimuli along various dimensions. Kelly viewed people as scientists who use their own personal systems of constructs or mental representations to impose meaning on the world. According to this view, people use constructs to understand, predict, and control their environments. These constructs are bipolar dimensions (such as shy versus outgoing, energetic versus lazy, etc.). A more cognitively complex person would perceive greater dimensionality (i.e., use more constructs) in determining the attributes of stimuli than would a less cognitively complex person. According to Bieri (1955, 1971) and Bieri, Atkins, Briar,

Leaman, Miller, and Tripodi (1966), the term cognitive complexity refers to the manner in which individuals structure their social worlds. Specifically, Bieri et al. defined CC as the capacity to "construe social behavior in a multidimensional way" (p. 185). The present paper extends Bieri et al.'s definition to encompass the perceiving of any stimulus in a multidimensional way.

Bieri et al.'s definition suggests that CC is a unitary construct. But, there is considerable evidence that CC is a multidimensional instead of a unitary construct. For example, Vannoy (1965) discovered evidence that CC is multidimensional. In a factor-analytic study of a battery of CC measures, he extracted eight factors, none of which included all of the measures. Vannoy's investigation revealed evidence for several important dimensions of cognitive complexity: (a) the degree of sensitivity to judgment variables, (b) the degree of discriminability on judgment variables, and (c) the degree to which the world is viewed in a narrow and ordered way.

Seaman and Koenig (1974) also provided experimental evidence for the multidimensionality of CC. In a study of 146 undergraduates, they employed seven measures of CC derived from the REP test. Results indicated that three factors accounted for 78% of the total variance in ratings. These factors were "positive affect cognitive complexity-simplicity," "negative affect cognitive complexity-simplicity," and assumed dissimilarity (p.387).

In subsequent research, Jones and Butler (1980) suggested that CC involves not only dimensionality per se but also the fineness of the distinctions made along the various dimensions. They employed subgroup

analysis to examine the factor structures of environmental characteristics ratings for high, medium, and low-complexity raters. The operational definition of CC involved a technique adapted by Jones and Butler (1980) from Bem and Allen (1974) and Solomon (1977) which assesses the variability of responses to a work-environments perception questionnaire. A standard deviation was computed for each individual's responses to each questionnaire composite. Finally, the authors summed these deviation scores to obtain an overall complexity score. Although high-complexity raters provided six factors (vs. four for low-complexity raters), some dimensions were consistent across subgroups. These stable dimensions included leadership patterns, work-group interactions, and role characteristics. However, there were differences between subgroups "in the degree to which organizational level characteristics were distinguished (a) from task and other domains and (b) among themselves" (p. 8). For example, the authors found that low-complexity judges produced a component which reflected a more global description of the organization (such as role conflict), while high-complexity judges produced components which made finer the distinction between role conflict and organizationally-based conflict.

Another proposed aspect of CC is integration. Crockett (1965), Schroder et al. (1967), and Scott, Osgood, and Peterson (1979) argued that abstract thought involves both dimensionality and integration. Indeed, Schroder et al. asserted that there is no necessary correspondence between the number of dimensions one perceives and the level of one's information processing. What is relevant are both the manner in which an individual combines attributes (dimensions) and the distinctions made along the

various dimensions. Streufert and Streufert (1978) have revealed that cognitive integration is related to moderate levels of differentiation along various dimensions. Unfortunately, the usual methods for measuring integration (Schroder et al., 1967; Zajonc, 1960) have been more problematic than have efforts to tap dimensionality. Scott et al. (1979) have summarized these shortcomings by suggesting that there is no consensus, at either the conceptual or operational levels, for measuring integration.

Because cognitive complexity is multidimensional, Scott et al. asserted that it would be more accurate to use the term dimensionality when speaking of differentiative functions. The term complexity, they argued, is more accurately applied to both differentiative and integrative functions. Thus, the argument for examining integration in any study of CC is compelling. But, any examination of a multidimensional construct must begin somewhere. It makes sense that a reasonable first attempt at reoperationalizing CC should focus on dimensional capacity. The present study, therefore, takes this focus. More importantly, however, the present methodology lends itself to an extrapolation not only of subjects' cognitive dimensionality but also their integration (Schroder et al. 1967). Thus, the present study also lays the groundwork for an examination of integrative complexity. This issue will be explained more fully in a later section. (It should be noted here that henceforth, except when otherwise indicated, reference to the term complexity means dimensionality.)

Another important issue pertaining to CC is that of domain specificity. Although Bieri and Blacker (1956) provided evidence for the

generalizability of CC across stimulus domains (people and inkblots), Sechrest and Jackson (1961) did not confirm such generalizability. Similarly, Crockett (1965) contended that an individual's dimensionality is specific to a particular stimulus domain. To test further the domain specificity hypothesis, Durand and Lambert (1976) administered three versions of the Bieri Role Construct Repertory test (described in a later section): one for automobiles, one for toothpaste, and another for interpersonal relations. The results revealed that although CC was significantly correlated for automobiles and toothpaste ($r=.33$, $p < .05$) and for automobiles and interpersonal relations ($r=.22$, $p < .05$), the correlations tended to be low enough to be of doubtful practical importance. Thus, as a practical matter there was little generalizability across domains.

Consistent with the domain specificity hypothesis, Schroder et al. (1967), Streufert (1982), and Streufert and Streufert (1978) suggested an interactive view of complexity, positing that (a) the level of information processing varies within and between subjects and (b) there is some optimal level of dimensionality/integration. Streufert (1982) asserted that complexity involves a U-shaped function in which behavioral complexity is plotted as a function of environmental complexity. Different curves occur for cognitively complex versus cognitively simple individuals. Along these lines, Schneier (1977) suggested a cognitive compatibility theory that posits an ideal match between task/environment characteristics and cognitive complexity of the rater in a performance appraisal task. But, subsequent research has not supported this view (Bernardin, Cardy, & Carlyle, 1982; Lahey & Saal, 1981). In response to

such null results, Streufert (1982) argued that a behaviorally anchored rating task, such as the one used by Bernardin et al., does not necessitate a high degree of differentiation and integration.

Peterson and Scott (1975) have taken a compromise position in this controversy. They asserted that cognitive style is "to some degree topic specific and to some degree generally manifested" over several stimulus domains (p. 372). Peterson and Scott concluded that cognitive style depends not only upon the stimulus domain but also upon the interaction of the person and the domain.

The issue of interactive complexity is important for several reasons. If complexity is both person and situation specific (i.e., interactive), then generalizability across persons and situations may be difficult. From the discussion above, it is evident that stimulus domains such as job titles must be examined individually. In addition, the interactive nature of cognitive complexity must be taken into account in any measurement strategy. This matter will be discussed further in the methods section.

The present section considered some definitional issues pertaining to the cognitive complexity construct. In particular, evidence was presented which suggested that CC involves both differentiative and integrative capacities. In addition, it was suggested that CC involves the fineness of distinctions along the various dimensions. As it is conceived here, CC is not a trait which is stable across various content domains, but rather a process variable which may interact with features of the stimulus. Finally, because research has suggested substantial stimulus domain specificity, the importance of examining

CC-dimensionality within a particular stimulus domain, such as jobs, was discussed. These definitional considerations have important implications for the operationalizing of CC. A discussion of operational issues is presented below.

OPERATIONALIZING COGNITIVE COMPLEXITY

As Bieri et al. (1966) and Scott (1963) indicated, the measurement of cognitive structures, including cognitive complexity, has proven problematic. A variety of operations for measuring the construct have been employed. Indeed, Bonarius (1965) has enumerated at least ten different methods for operationalizing CC. Because of the plethora of measures, the comparability of CC across studies is difficult. Some of the approaches to operationalizing CC include the Role Construct Repertory Test (REP), Scott et al.'s (1979) Listing and Comparing Measure, and factor analyzed semantic differential scales. Scott et al. (1979) have also proposed a geometric solution (to be described later in this section). Additionally, Crockett (1965) developed a Role Construct Questionnaire (RCQ). Finally, there is the multidimensional scaling approach suggested by Bieri et al. (1966) and Scott et al. (1979) and adapted for the present study.

Among the measures of dimensionality, the most commonly used is the REP test. Actually, the REP test is somewhat of a misnomer (Neimeyer & Neimeyer, 1981). These authors asserted that "the REP is not a single test, or a questionnaire with fixed content, but a broad variety of techniques sharing certain methodological features" (p. 194). One version of this instrument consists of a grid with columns (for persons

to be compared) and rows (for the constructs underlying the rated similarity of the comparison persons). Comparison persons hold such role titles as parents, friends, teachers, etc. Persons are compared three at a time. Subjects identify a construct along which two of the persons are alike yet different from the third person. Then, using a six-point rating scale, subjects rate all persons on all characteristics. An index of complexity is calculated by comparing the grid ratings in each row to every other row. It is important to note that in this approach subjects generate their own constructs.

There are several reasons for questioning the usefulness of the REP. First, it lacks the requisite isomorphism between the construct and the measure (Scott, 1963). As Scott (1963) noted, "the procedure for analyzing data should be structurally appropriate to the property being assessed" (p. 269). What the REP seems to provide is an indication of the constructs that are used and whether or not they are used in the same way across the rates. Thus, the REP is not a direct measure of the dimensionality of the rater. Second, the REP assesses cognitive complexity less directly than other methods such as sorting tasks and MDS (Scott, 1963). Third, support for the REP's predictive validity, particularly with respect to the prediction of rating accuracy, has been weak (Bernardin et al. 1982; Sechrest & Jackson, 1961). (This issue is discussed more fully in a later section.) Fourth, the use of the REP is constrained by potential bias in subjects' sampling of constructs (Bonarius, 1965). Fifth, the traditional REP task is very tedious for subjects. Finally, the traditional person-roles REP may be confounded by familiarity. That is, subjects' ratings may be differentially affected

by knowledge of the rater. One benefit of the REP, however, is that (except in its modified version) it does not assume the constructs a priori.

Bieri et al.'s (1966) modification of the REP test provides subjects with constructs that they use to perform the rating task. This approach offers the advantage of saving time and reducing subject tedium. Although Bieri et al. (1966) and Tripodi and Bieri (1963) assert that provided constructs and subject-generated constructs produce similar results, the evidence on this issue is equivocal (Crocket, 1965). Thus, caution is required concerning the use of experimenter-provided constructs.

Another measure of dimensionality, Scott et al.'s Listing and Comparing Measure (LCM), requires that subjects

generate a set of objects as well as successive subsets that are alike for some characteristic. Objects that clearly differ on that attribute are also clearly noted, but a classification of every object is not required (p.104).

LCM dimensionality is computed from the measure of dispersion, "H" (Attneave, 1959), which is an index of the number of dimensions in the subject's grouping system. Logarithms are required for the calculation of this index. By their own admission, Scott et al.'s LCM is constrained by the representativeness of the domain. Because the domain of objects has been generated separately by each subject, it may not be a representative sample of objects.

Another method for estimating the dimensional capacity of individuals is the application of Scott et al.'s geometric model to ratings or checklists. This approach requires that subjects rate a (standard) set of objects according to a (standard) set of attributes.

It is then possible to estimate what Scott et al. term "redundancy" between a pair of attributes by computing the squared correlations for the set of objects. Then dimensionality (D) may be computed according to the following formula:

$$D = \frac{k^2}{K + 2\sum r^2} \quad [1]$$

"where k is the number of attributes employed by the respondent and $\sum r^2$ is the sum of all the squared intercorrelations among the k attributes" (p. 108). This geometric approach has not been widely adopted in studies employing CC-dimensionality as a predictor variable.

The semantic differential scale (Osgood, 1962) is another means of estimating dimensionality. This approach imposes constructs by requiring subjects to rate persons or objects according to pairs of bipolar adjectives such as: (1) ineffective-effective, (2) shy-outgoing, (3) weak-strong, etc. Ratings are then factor analyzed. Foremost among the criticisms of this approach to recovering subjects' dimensionality is that semantic differential scales do not in fact recover subjects' dimensionality at all, but rather the dimensionality of the scale developer (Goldstein & Blackman, 1978; Pervin, 1973).

As a means of extracting dimensionality, Crockett (1965) developed the Role Construct Questionnaire (RCQ). The measure consists of short descriptions written by subjects within a three-minute time limit. Vignettes describe eight individuals who fit particular roles. These vignettes are scored according to the number of interpersonal constructs

employed by each subject. One major limitation of this procedure is that subjects' performance may be constrained by verbal fluency.

Although multidimensional scaling (Kruskal, 1964; Kruskal & Wish, 1978) has been employed most frequently to describe results for groups of subjects, Tucker and Messick (1963) paved the way for the use of MDS to tap individual differences in dimensionality. Indeed, Schroder et al. (1967) and Scott et al. (1979) suggested that such an individual-differences approach would be useful in the study of cognitive dimensionality. Another important development was Carroll and Chang's (1970) algorithm (INDSCAL), which facilitates the retrieval of individual differences in dimensionality. More recently, Peterson and Scott (1983) have employed MDS to reveal the number of dimensions that individuals employ when perceiving lists of nations. In so doing, these authors have obtained considerable convergent validity between MDS-dimensionality and other measures (checklist description and rating scale approaches) of dimensionality.

Because of its usefulness, multidimensional scaling warrants further discussion here. MDS assumes that the similarities (or dissimilarities) between stimuli may be portrayed in a multidimensional space. The associated spatial representation is derived by having subjects rate the similarity of pairs of objects. In doing so, raters impose an implicit set of attributes on their ratings. It is the task of MDS to recover the implicit dimensions by estimating the number of independent dimensions defining such a space. To do this, the INDSCAL algorithm produces a geometric representation of the psychological distance between pairs of stimuli. It is assumed that for each subject

there is a unique configuration of stimulus coordinates. From this configuration, the procedure extracts the best n-dimensional space for the group. Dimensionality is defined as the scaling solution (number of retained dimensions) beyond which additional dimensions do not significantly increase the proportion of variance accounted for (Kruskal & Wish, 1978). Unlike traditional MDS techniques, INDSCAL accommodates individual variation while the traditional approaches treat such variation as error.

Though beyond the scope of the present paper, integration may also be inferred from MDS analyses. Schroder et al. (1967, pp. 180-1) summarized MDS's usefulness in this regard, indicating that: (1) The presence of multiple dimensions provides suggestive evidence for a schema. MDS dimensions, they argue, are by definition integrated. A dimension will not be extracted unless it contributes to each judgment of similarity. (2) The number of dimensions uncovered by MDS analysis reflects the number of sources of information. One may also determine how important each source of information is to the rating of similarities. This information is found in the individual subjects' weights. (3) "Often the meaning of MDS-dimensions may be revealed by the arrangement of stimuli on the dimension" (p. 180). The upshot of this summary of the usefulness of MDS is that MDS may provide more information than merely the number of dimensions which contribute significantly to average similarity judgments.

This section discussed the relative advantages and disadvantages of several methods of operationalizing CC-dimensionality. It was argued that, although a variety of operations have been applied to the

measurement of CC-dimensionality, one potentially useful approach (MDS) has received insufficient attention. This operational definition may be a useful means for examining CC-dimensionality in work settings.

CONSTRUCT VALIDITY ISSUES

Construct validity (the extent to which a measure assesses what it purports to measure) is assessed not by a quick yes-or-no assessment but by a painstaking accumulation of evidence. This evidence includes: (1) the reliability (e.g., test-retest) of the measure; (2) the internal consistency reliability of the instrument (does the measure assess one construct or a number of constructs?); (3) the content validity of the measure (i.e., is the adequacy of the sampling of the content domain); (4) prediction (does the construct "behave" as it "should" -- that is, does it correlate with the constructs the theory predicts it should and remain uncorrelated with other constructs?). For this latter line of investigation, questions of convergent and discriminant validity (Campbell & Fiske, 1959) must be assessed. In other words, the measure should correlate highly with other measures of the same construct (convergent validity) and correlate little with similar-method measures of different constructs (discriminant validity).

A fundamental consideration is the reliability of any measure because reliability sets the limits for validity. Schneier (1979) reports a test-retest reliability of .82 ($p < .001$) for the REP. However, Goldstein and Blackman (1978) have reviewed the reliabilities of various modifications of the REP. These authors found test-retest reliabilities ranging from .46 to .86. Their conclusion is that although the

test-retest reliabilities are statistically significant, they are "somewhat below the level that is generally expected" (p.111). In their literature review, O'Keefe and Sypher (1981) found test-retest reliabilities below .70 for most measures of complexity. Furthermore, O'Keefe and Sypher (1981) report that the REP is unusually sensitive to variations in its administration and procedures.

Regarding internal consistency, as indicated in this introduction, research has shown that cognitive complexity is a multidimensional construct. As O'Keefe and Sypher have concluded, the various measures of cognitive complexity may not all be assessing the same thing. This fact would argue against overall cognitive complexity being internally consistent. However, such a multidimensional feature does not preclude the possibility that any one component of CC, such as dimensionality, may be important. Indeed, in other areas of industrial-organizational psychology (job satisfaction, for example), an examination of the facets of a multidimensional construct has been somewhat more fruitful than relying on the global measure.

The internal consistency issue is relevant to content validation in the sense that any effort to tap only one aspect or dimension of CC does not sample from the entire content domain. It would appear that content validity in such a case would be necessarily low. Again, however, this does not preclude the possibility that one component of CC may be worth examining empirically.

As indicated earlier in this introduction, the convergent validity of CC-dimensionality has been explored by Peterson and Scott (1983). In their attempt to arrive at fundamental measurement, these authors

examined the intercorrelations between several methods of measuring cognitive dimensionality: (1) pair-wise comparison, (2) rating scale, and (3) checklist description. The intercorrelations ranged from .53 to .70 and were all significant ($p < .001$). In another study (Schneier, 1979), convergent validity was demonstrated between Scott's (1962) measure of complexity and the Bieri (1966) grid form of the REP ($r = -.19$, $p < .05$). However, the correlation, while statistically significant, was unimpressive. Despite the apparent relatedness of various CC-measures revealed by Peterson and Scott (1983), other studies show that the convergent validity issue is less certain. For example, O'Keefe and Sypher (1981) report intercorrelations between Bieri's REP and Crockett's (1965) measure, ranging from $-.19$ to $+.14$.

Evidence related to the discriminant validity of CC suggests that CC does not appear to be significantly related to such variables as intelligence and verbal ability. (Bieri & Blacker, 1956; Crockett, 1965; Leventhal, 1957; Scott, Osgood, & Peterson, 1979; Wicker, 1969). Streufert and Streufert (1978) have reviewed the literature concerning this issue and found that any potential relationship between cognitive complexity and intelligence appears to be at the lower end of intelligence. That is, persons of very low intelligence are not likely to be multidimensional. More recently, O'Keefe and Sypher (1981) reviewed the literature and again found that correlations between between cognitive complexity and intelligence tend to be low and nonsignificant ($-.20$ to $.20$ for Bieri's REP measure).

Cognitive complexity also appears to differ from field dependence/independence (FD/I). Field dependence/independence (Witkin,

Dyk, Faterson, Goodenough, & Karp, 1962) reflects the tendency of people to rely either on the field or themselves as referents. In other words, field-dependent individuals rely on some aspects of the environmental field when they view stimuli. Field-independent individuals rely on some internal orientation or standard. This is a different notion from differentiation along the various dimensions or constructs used in one's conceptualization of the world (Witkin & Goodenough, 1977).

Indeed, Streufert and Streufert (1978) have outlined the nature of the distinction between these two different usages of the term "differentiation." They cite Witkin, Goodenough, and Karp (1967), who viewed psychological differentiation as a kind of differentiation relevant to perceptual-motor tasks. In contrast, according to Streufert and Streufert, "differentiation" for research in complexity theory concerns "cognitions involving verbal 'concepts,' 'dimensions,' etc." (p. 14). Bieri (1971) suggests that cognitive complexity is a more specific notion than FD/I. CC, he asserts, pertains to differences in the way people process information about their social worlds.

Regarding spatial ability, Thompson, Mann, and Harris (1981) conclude that cognitive complexity is related to spatial task performance for males but not for females. On the other hand, FD/I correlates highly with a number of spatial ability tests (Vernon, 1972).

Research reported in this section illustrates some of the construct-validity issues which have proven problematic for cognitive complexity researchers. It was shown that (1) reliability, which circumscribes the limits for validity, was somewhat weak; (2) the content validity for measures of cognitive complexity is generally low; (3)

internal consistency is low; and (4) there is mixed evidence for the convergent and discriminant validity of the construct.

POTENTIAL IMPORTANCE OF COGNITIVE COMPLEXITY IN WORK SETTINGS

This section describes the potential importance of reoperationalized cognitive complexity. If MDS-dimensionality can actually be demonstrated in this context, the implications for behavior in work settings are enormous. As Jones and Butler (1980) pointed out, it is likely that cognitive style influences the manner in which behavioral outcomes and causal inferences about those outcomes are derived. This may be so because raters who are constrained by their ability to dimensionalize stimuli may err in the judgments that underlie performance appraisal systems and wage structures. Thus, job analysis, job evaluation, and performance appraisal could be particularly vulnerable to the effects of CC. Furthermore, job design efforts, which are predicated on rating judgments, would be highly susceptible to the influence of such cognitive structuring variables. A brief discussion of the literature in the areas of job design and performance appraisal follows.

As indicated above, the job-design literature is relevant for two reasons: (1) job design is based on the perceptual dimensions underlying jobs and (2) job design efforts, which are based on rating judgments, may be susceptible to rating errors which in turn may be influenced by cognitive dimensionality. The perceptual dimensions underlying jobs have both theoretical and practical importance in the area of job design.

From a theoretical perspective, one may have an interest in the manner in which people perceive their jobs. As a practical matter, practitioners cannot redesign jobs unless they know the dimensions along which jobs should be redesigned. The task attributes approach (Hackman & Lawler, 1971; Hackman & Oldham, 1975, 1976; Stone & Gueutal, 1985; Turner & Lawrence, 1965) emerged to provide such dimensional information.

As noted by Stone and Gueutal (1985), most investigations of the attributes underlying jobs have employed measures such as the Job Diagnostic Survey (JDS) of Hackman and Oldham (1975), the Yale Job Inventory (YJI) of Hackman and Lawler (1971), the Requisite Task Attribute (RTA) of Turner and Lawrence (1965), and other similar questionnaires. Stone and Gueutal (1985) pointed out that all of the existing measures of job characteristics are rooted in the work of Turner and Lawrence (1965). However, since by their own admission, Turner and Lawrence identified their underlying dimensions a priori, it is unclear how well the RTA and other similar questionnaires parallel employees' perceptual dimensions.

In a similar manner, Hackman and Lawler (1971) and later Hackman and Oldham (1975, 1976) refined and supplemented the concepts explored earlier by Turner and Lawrence. The result was the Hackman and Oldham (1975) Job Characteristics Model. Its five core dimensions are described as follows:

1. Skill Variety (SV): reflects the degree to which the job requires incumbents to perform a variety of activities.
2. Task Identity (TI): concerns the extent to which the job involves the completion of a whole unit of work.

3. Task Significance (TS): is the extent to which the job may significantly affect others.
4. Autonomy (A): is the extent to which the incumbents are free to schedule their work activities and to determine procedures.
5. Feedback (F): is the extent to which the incumbents receive clear information about the effectiveness of their performance.

According to their model, the five core dimensions (task identity, skill variety, task significance, autonomy, and feedback) relate to the critical psychological states (experienced meaningfulness of work, experienced responsibility, and knowledge of results). These critical psychological states lead to personal and organizational outcomes such as enhanced performance, increased satisfaction, reduced turnover, etc. It should be noted that Growth Need Strength or GNS (an index of the extent to which a person desires an enriched job) acts as a moderator variable for both the relationship between core dimensions and critical psychological states and the relationship between critical psychological states and personal/organizational outcomes. In addition to describing these five critical psychological states, Hackman and Oldham (1975) arrived at a combinatory rule for the establishment of a unidimensional index of job scope:

$$\text{Motivating Potential Score} = (SV + TI + TS)/3 \times A \times F$$

At first, the above research appeared to offer a framework for future job-design applications and job-design investigations. Such research also held the promise of recognizing the basis of individual

reactions to jobs. However, this early research was also vulnerable to a number of criticisms.

For example, Dunham (1976), Harvey, Billings, and Nilan (1985), and Roberts and Glick (1981) have pointed out that there is a lack of independence among the dimensions. This finding contradicts Hackman and Oldham (1975), who argue that the core dimensions are independent. Roberts and Glick (1981) argue further that a five-factor model, such as Hackman and Oldham's, is not consistently demonstrated in the literature. Indeed, studies by Aldag, Barr, and Brief (1981), Dunham (1976, 1977), Dunham, Aldag, and Brief (1977), Lee and Klein (1982), Pierce and Dunham (1978), and Pokorney, Gilmore, and Beehr (1980) have failed to capture the factor structure of the traditional Hackman and Oldham (1975) job characteristics model. Roberts and Glick (1981) also criticized such traditional job-characteristics research for, among other things, inadvertently capitalizing on common method variance and ignoring the question of perceptual vs. objective task assessments. The method-variance problem in the use of the JDS has also been documented by Harvey et al. (1985). The issue of perceptions and their role in task assessment is one of the major criticisms by Stone and Gueutal (1985) and will be discussed more fully later in this section.

Other work casts further doubt on the earlier Job Characteristics Model of Hackman and Oldham (1975). Having meta-analyzed a number of factor-analytic studies, Fried and Ferris (1987) revealed that while there appears to be more than one perceptual dimension underlying jobs there may not be the five posited by Hackman and Oldham (1975). In a recent attempt to shed additional light on the factor structure of jobs,

Kulik, Oldham, and Langer (1988) contrasted the factor structure of the Job Diagnostic Survey (JDS) with a revised version by Idaszak and Drasgow (1987). They found that the revised version conformed more closely to a five-factor structure than the original JDS. Idaszak, Bottom, and Drasgow (1988) reported further that -- with the exception of a new, somewhat weak sixth factor -- the revised JDS has an invariant factor structure across the five job characteristics of Hackman and Oldham (1975).

However, this finding does not negate the criticism that the Turner and Lawrence (1965), the Hackman and Oldham (1975), and the Idaszak et al. (1988) dimensions were not empirically derived.

In another study, Stone and Gueutal (1985) attempted to empirically derive job dimensions. They reported that three dimensions underly jobs. Those dimensions are: (1) the complexity of the job, (2) the extent to which the employee works with the public, and (3) the physical demands of the job. According to Stone and Gueutal, multidimensional scaling stimulus coordinates for the first dimension correlate highly with levels of "skill variety," "complexity of job," "job requires a great deal of reasoning," etc. (pp.387-388). The second dimension indicates the extent to which incumbents interact with people on the job and provide a service. Finally, the last dimension is a reflection of the extent to which the job involves working in an environment that is clean and safe as opposed to dirty and unsafe. The 1985 Stone and Gueutal study provides the advantage of determining subjects' own perceptual dimensions of jobs rather than deriving them from a priori assumptions as did Turner and Lawrence and, by extension, Hackman and Lawler (1971) and Hackman and Oldham (1975, 1976). Stone and Ruddy (1987) have found evidence for the

generalizability of the Stone and Gueutal (1985) results to samples outside the laboratory. More recently, Zaccaro and Stone (1988) have reaffirmed the Stone and Gueutal model. These authors claim that the dimensions of jobs are probably best portrayed by a model different in kind from the traditional five-dimensional job characteristics model. In addition, they assert that such early approaches unnecessarily "restrict the capacity to account for variance in such criteria as job satisfaction and intent to leave an organization" (p. 249). They report greater success at accounting for variance in job satisfaction with the use of such empirically derived job dimensions as the Stone and Gueutal dimensions. For example, their results suggest that two of three Stone and Gueutal dimensions (those approximating complexity and physical demands/danger) significantly predict overall satisfaction over and above motivating potential score (MPS).

It would seem that the direction of current research may be shifting toward an embracing of the Stone and Gueutal dimensionality. This is despite the fact that research rooted in the job-analysis tradition appears to bear a somewhat different message concerning the factor structure of jobs (Harvey, Friedman, Hakel, & Cornelius, 1988). Using the Position Analysis Questionnaire (PAQ) and the Job Element Inventory (JEI), Harvey et al. (1988) found that the five-factor structures of the PAQ and JEI are similar. The factors revealed by Harvey et al. are: (1) decision-making/communication/general responsibility, (2) skilled job activities, (3) information-processing activities, (4) physical activities/related environmental conditions, and (5) using equipment/providing service (p. 641). Although apparent similarities between the

Harvey et al. and Stone and Gueutal dimensions exist (complexity vs. skilled job activities; physical activities/environmental conditions vs. physical demands; using equipment/providing a service vs. works with the public), the number of dimensions retrieved by Harvey et al. differs from the number captured by Stone and Gueutal. Moreover, the use of the job analysis technology may be preferable to requiring subjects to report on their perceived similarity of job titles.

In view of the brewing controversy, additional work documenting the replicability of Stone and Gueutal's (1985) three-dimensional solution seems warranted. The present study, with its large sample size, provides an excellent opportunity for such an investigation.

Job-design research (Cherrington & England, 1980; Stone, 1976; Stone, Mowday, & Porter, 1977) has suggested also that a number of individual-difference variables (for example, desire for an enriched job, need for achievement, and work values) may interact with job characteristics to influence incumbents' job perceptions. These perceptions may in turn influence job outcome measures such as performance, general satisfaction, and satisfaction with the job itself.

A logical extension of such individual-difference studies is the hypothesis that dimensionality also may moderate the relationship between job characteristics and job characteristics ratings. According to this line of reasoning, individual differences in ability to conceptualize to-be-rated stimuli ought to affect ratings of the stimuli. But when Stone and Gueutal (1985) used multidimensional scaling to examine job similarity ratings for trichotomized cognitive complexity subgroups, no effects for REP-CC were noted. Specifically, Stone and Gueutal found that

multidimensional scaling solutions did not differ significantly for high, medium, or low cognitive-complexity subgroups. This null result underscores the controversy surrounding the cognitive complexity (dimensionality) construct. A clarification of cognitive dimensionality's role is one important aspect of the present research.

Another area which may be influenced by cognitive dimensionality is performance appraisal accuracy. Most prior research concerning the REP test and rater accuracy pertains to the accuracy of predicting behavior. In other words, researchers have typically asked the question, "How well does cognitive complexity (operationalized by the REP) correlate with peoples' accuracy of predicting others' social behaviors?" Bieri (1955), for example, found that subjects who were high in REP-CC were better predictors of others' behaviors than were their low-CC counterparts. This finding has been supported by subsequent research (Addams-Webber, 1969). However, it should be noted that in the Bieri study, the author examined the relationship between REP scores and the efficacy of predicting a classmate's responses on a social-situations test. As Goldstein and Blackman (1978) point out, the results were significant only when a one-tailed test for significance was used. In a variation of this line of investigation, Leitner, Landfield, and Barr (1974) summarized the literature by concluding that cognitive complexity does correlate with accuracy of predicting differences but not similarities in others' behavior. Their conclusions have been refuted in a recent study by Lal and Singh (1984), who found that one's level of cognitive complexity did not predict one's judgment accuracy. It would seem that CC's ability to predict interpersonal behavior is uncertain.

Addams-Webber (1969) explored the hypothesis that one's level of cognitive complexity can predict the accuracy with which one predicts another's constructs. The results indicated that high-CC subjects were better at identifying the constructs of their partners in the study than were low-CC subjects. On the other hand, Sechrest and Jackson (1961) investigated whether or not high-CC raters would better predict the construct systems of others. Results indicated an insignificant relationship between complexity and accuracy. However, the ambiguous evidence regarding CC-REP's ability to predict both interpersonal behavior and others' constructs does not address the issue of REP's potential ability to predict performance appraisal accuracy. It should be noted that neither the Addams-Webber nor the Sechrest and Jackson studies investigated performance appraisal accuracy. Unfortunately, early research in the area of CC has given little attention to performance appraisal accuracy.

To discuss properly the issue of performance appraisal (rater) accuracy, it is first necessary to identify pertinent definitional issues. Separate from the matter of cognitive complexity (dimensionality), rater accuracy in performance appraisal situations has received considerable attention in the literature (Becker & Cardy, 1986; Borman, 1977; Cronbach, 1955; Murphy, Garcia, Kerkar, Martin, and Balzer (1982). Cronbach's landmark (1955) paper established that rater accuracy may be broken down into four components: elevation (E), differential elevation (DE), stereotypic accuracy (SA), and differential accuracy (DA).

Thus, ratings will depend on the overall level of a rater's ratings (E), the average rating for the dimension upon which a ratee is judged (SA), the average rating for each ratee across dimensions (DE), and the residual or (DA). According to Cronbach, DA indicates the rater's ability to differentiate between ratees on any particular item.

Differential accuracy, as it is defined, is really more properly rater INACCURACY. This is so because accuracy is conceived as the overall difference between ratings and true scores, hence inaccuracy. Similarly, the components of accuracy (of which differential accuracy is one) reflect aspects of the overall difference between ratings and true scores. In other words, a score of zero indicates perfect accuracy for that component.

A few additional comments concerning DA are relevant. Differential accuracy (or rather inaccuracy) is described by Murphy et al. (1982) and Cardy and Dobbins (1986) as the "finest grain measure of accuracy" (p. 674). This is because differential accuracy is a measure of the difference between ratings and true scores (when controlling for overall rating level as well as rating levels for both dimensions and particular ratees). In other words, Cardy and Dobbins suggest that DA is a measure of non-systematic noise. Cronbach's equation for differential accuracy is as follows:

$$DA^2 = \frac{1}{kn} \sum_i \sum_j [(r_{ij} - \bar{r}_{i.} - \bar{r}_{.j} + \bar{r}_{..}) - (t_{ij} - \bar{t}_{i.} - \bar{t}_{.j} + \bar{t}_{..})]^2 \quad [2]$$

Note that r_{ij} and t_{ij} are rating and true score for ratee i on dimension j ; $\bar{r}_{i.}$ and $\bar{t}_{i.}$ are mean rating and true score for ratee i ; $\bar{r}_{.j}$ and $\bar{t}_{.j}$ are mean rating and true score for dimension j ; and $\bar{r}_{..}$ and $\bar{t}_{..}$ are mean rating and true score over all ratees and dimensions (Becker & Cardy, 1986). (This equation will be used in the analyses described later.)

Additionally, other components of inaccuracy (elevation, differential elevation, and stereotypic) may be calculated according to the following formulae:

$$E^2 = (\bar{r}_{..} - \bar{t}_{..})^2 \quad [3]$$

$$DE^2 = 1/n \sum_i [(\bar{r}_{i.} - \bar{r}_{..}) - (\bar{t}_{i.} - \bar{t}_{..})]^2 \quad [4]$$

$$SA^2 = 1/k \sum_j [(\bar{r}_{.j} - \bar{r}_{..}) - (\bar{t}_{.j} - \bar{t}_{..})]^2 \quad [5]$$

Cronbach (1955) also identified subcomponents of differential accuracy, differential elevation, and stereotypic accuracy -- DACOR, DECOR, and SACOR respectively. The equation for these are:

$$DAr = r_{r,t} \quad [6]$$

DACOR

where r indicates ratings, t indicates true scores and $(')$ indicates that these values are deviation scores.

$$DEr = r_{r_i, t_i} \quad [7]$$

DECOR

where $\bar{r}_{i.}$ is the mean rating for each ratee across all dimensions and $\bar{t}_{i.}$ is the mean true score for each ratee across all dimensions.

$$SAr = r_{r.j} \bar{t}_{.j} \quad [8]$$

SACOR

where $\bar{r}_{.j}$ is the mean rating for each dimension across all ratees and $\bar{t}_{.j}$ is the mean true score for each dimension across all ratees.

Cronbach (1955) and later Becker and Cardy (1986) have pointed out that the above subcomponents may be important aspects of ratings, which should be examined. Cronbach (1955) and Becker and Cardy (1986) also have contended that one's choice of an accuracy measure ought to be guided by the purpose of the research.

In the area of performance appraisal, research has provided some evidence that individual difference variables such as cognitive complexity may affect raters' perceptions. For example, Leventhal (1957) determined that cognitive complexity (CC) influences one's perceptions. Campbell (1960) revealed that people scoring low on CC were more likely to categorize ratees as either good or bad than were their high-CC counterparts. Some investigators of performance appraisal have suggested that such cognitive individual-difference variables may influence rating behavior (Bieri et al., 1966; Feldman, 1981; Schneier, 1977). Feldman (1981) adds that "since cognitive complexity is based on the number of categories and relationships among the categories used by an individual, it is not surprising that those with a more differentiated category system would be able to make the relevant judgments with less error" (p. 141).

This, of course, assumes that highly differentiated raters do not, on average, attend to irrelevant dimensions.

Schneier (1977) examined the effects of REP-cognitive complexity (high versus low) and rating format (Behavioral Expectation Scales versus graphic rating scales) on response-set errors in a rating task. Results indicated that cognitively complex raters gave lower average ratings (i.e., were less lenient) when using the BES than when using the alternate format. Conversely, cognitively simple raters gave lower average ratings when using the alternate format than when using the BES format. Cognitively complex raters had less halo than did cognitively simple raters for both the BES and alternate formats. Regarding restriction of range, cognitively complex raters had less restriction of range than cognitively simple raters for the BES format. For the alternate format, restriction of range results were not significant. Schneier's efforts were directed at supporting his theory of cognitive compatibility. This theory suggests that complex raters do better with complex rating formats such as BES whereas cognitively simple raters do better with simple formats such as graphic rating scales. In addition, his findings suggest enhanced accuracy for cognitively complex raters.

Contrary to Schneier's findings, Lahey and Saal (1981) assert that the combined effects of rater complexity and rating formats do not predict rater accuracy. These authors examined cognitive complexity, using REP, factor analytic data from REP, and a sorting task. In each of its operational definitions, cognitive complexity failed to significantly predict rater accuracy and failed to interact with rating format as Schneier's cognitive compatibility model would suggest.

Other evidence poses difficulties for the validity of CC as previously operationalized. For example, Weiss and Adler (1981) have questioned the validity of cognitive complexity as an individual difference variable in rating tasks. They found that subjects differing in CC did not necessarily differ in their leadership prototype ratings.

Bernardin and Cardy (1981) examined the effect of REP-cognitive complexity on rating accuracy. No significant effects were revealed by that study. One other study, Sauser and Pond (1981), involved a subgroup analysis (high versus low cognitive complexity subjects) to determine whether CC moderated the "effectiveness with which ratees are evaluated" (p. 571). The results suggest that REP-CC did not moderate rating effectiveness.

As indicated earlier, Bernardin et al. (1982) also failed to reveal effects for REP-CC. In a series of studies, Bernardin et al. concluded that (1) CC was unrelated to rating accuracy, (2) CC was unrelated to halo error and rating formats when police sergeants rated patrol officers, and (3) the construct validity of CC was not supported in a study of student ratings of managerial performance and instructor effectiveness. These results tend to confirm Sechrest and Jackson's (1961) finding that the REP is not significantly correlated with differential accuracy in ratings. Thus, although a logical case may be made for the existence of a cognitive structuring variable (such as CC-dimensionality) in rating tasks, experimental evidence supporting the viability of this construct is ambiguous at best. For every study purporting to demonstrate the effects of CC, there are studies arguing the opposite. Unclear at this point is whether or not the difficulties encountered by investigators

of cognitive complexity are the result of: (a) the lack of evidence for the validity of the construct itself, or (b) the operationalizations of the construct. Accordingly, additional effort at resolving the operational issues seems warranted.

The present study makes additional contributions. Although MDS has been employed in previous studies of the dimensions underlying jobs, several differences between those studies and the present one are notable. When Burton (1972) used MDS to reveal the perceptual dimensions underlying job titles, he did not constrain raters to base their ratings upon the work activities for the job titles. Although Stone and Gueutal (1985) prescribed that the ratings concern work activities, these authors examined group data; they did not assess individual differences MDS-solutions. Dubin, Porter, Stone, and Champoux (1974) also examined the dimensions underlying job titles, but were concerned with dimensions more as a function of organizational role than as a function of cognitive individual differences variables such as cognitive complexity (dimensionality). Peterson and Scott (1983) considered the convergent validity of MDS dimensionality and other measures of dimensionality within the context of their effort to arrive at dimensionality's fundamental measurement. However, they concerned themselves neither with job activities nor with an external criterion such as rating accuracy.

In contrast, this study presents a methodology for examining individual differences in reoperationalized CC within a performance appraisal context. Moreover, the present study requires the raters to dimensionalize job activities. The convergent and predictive validities of MDS-dimensionality also are considered. Finally, the present study,

with its large sample size and methodology parallel to Stone and Gueutal (1985), provides an excellent vehicle for assessing the generalizability of those authors' three-dimensional model of job characteristics.

SUMMARY AND HYPOTHESES

In sum, it has been suggested that efforts to investigate cognitive complexity have been constrained by the operationalization of the construct. Various methods of operationalizing CC (REP, semantic differential scales, etc.) have been discussed. The approach suggested by Scott et al. (1979) -- that multidimensional scaling be used-- appears to be a fruitful method for freeing CC from its operational constraints.

Indeed, it has been argued that MDS dimensionality is closer conceptually to notions of dimensionality than is REP-cognitive complexity. Consistent then with the recommendations by Bieri et al. (1966) and Scott et al. (1979), the present study employs the MDS operational definition of cognitive complexity (dimensionality) in order to identify individual dimensionality. In addition, the apparent domain specificity of cognitive dimensionality appears to require the use of jobs as a stimulus set.

Accordingly, a methodology detailing the selection of such a stimulus set is outlined in the following pages. As indicated above, the present paper offers several extensions of the literature on cognitive complexity. This paper suggests that job duties are a focus in a job-related activity and that individual differences in MDS dimensionality are at issue. The paper also employs an external criterion

and assesses both convergent validity and differential correlation ($r_{REP,DA}$ vs. $r_{MDS,DA}$). The following hypotheses are examined:

Performance Ratings. Although past efforts to operationalize cognitive complexity (dimensionality) have yielded disappointing results, the literature suggests that an MDS operational definition may be predictive in performance appraisal tasks. This leads to Hypothesis 1.

Hypothesis 1 states that MDS dimensionality will be significantly and negatively related to rater differential inaccuracy (noise). Thus, raters who have available many dimensions with which to perceive their worlds will be less inaccurate (will produce ratings with less non-systematic noise) than will raters who have few dimensions available.

But a test of Hypothesis 1 leads only to the conclusion that dimensionality and accuracy are related. Although this issue is important, an issue of greater importance is whether or not MDS dimensionality better predicts rater accuracy/inaccuracy than does the REP test. Accordingly, an additional hypothesis must be tested.

Hypothesis 2 states that MDS dimensionality will predict rater inaccuracy in performance ratings better than will the REP test. In other words, MDS dimensionality will be more highly related to rater inaccuracy than will REP complexity.

Another matter of importance is the issue of convergent validity (Campbell & Fiske, 1959). Any effort to tap a construct ought to be correlated with other measures of that same construct. But, as explained earlier, the REP measure of CC is not isomorphic to the concept being measured. For example, although Scott et al. (1979) have found moderate intercorrelations between measures of dimensionality, Goldstein and Blackman (1978) have argued that -- unless derived from a common instrument format -- measures of dimensionality are not intercorrelated.

Despite this apparent controversy, one would expect that the two operational definitions of CC would be related but not isomorphic. Indeed, evidence for convergent validity is expected. But because REP is a less direct measure of CC than is MDS, convergence is expected to be moderate. Hypothesis 3 follows from this point.

Hypothesis 3 states that MDS dimensionality and REP-CC will be significantly related, but not isomorphic.

Frequency Ratings. In addition to these hypotheses, some additional questions arise. For example, is dimensionality related to the accuracy of frequency judgments? As indicated earlier, one criticism of the Bernardin et al. (1982) behavioral observation task was that it did not require complex judgments and that therefore MDS dimensionality and/or the REP may not be related to such ratings. However, others (Murphy et al., 1982) present a differing view. These authors have noted that, even though behavioral observation and performance evaluation are not totally independent of each other, they do require different processes. Behavioral observation involves such judgments as the frequency of a behavior's occurrence. Performance ratings, on the other hand, require evaluative judgment concerning the quality of performance. Indeed, Murphy et al. suggest that accurate behavioral observation is a requirement of accurate performance rating. It is therefore of interest to examine the question of whether or not the present data reveal any relationship between dimensionality and frequency ratings.

- 1) Does MDS dimensionality predict frequency ratings?
- 2) If MDS dimensionality does predict frequency ratings, is it a better predictor than the REP?

Job Characteristics. In light of the continuing controversy concerning the Hackman and Oldham (1975; 1976) Job Characteristics Model and the more recent Stone and Gueutal (1985) three-dimensional model of job characteristics, the present study will also examine the issue of the replicability of Stone and Gueutal's (1985) findings. The present data will permit an examination of the overall (group) MDS solution for its agreement with Stone and Gueutal's three-dimensional solution.

Hypothesis 4 states that there will be congruence between the captured dimensions of Stone and Gueutal (1985) and the retrieved dimensions of the present study.

The remainder of this paper outlines the methodology and results of the study. A discussion of its implications and limitations is then presented. Finally, possible directions for future research are discussed.

METHOD

OVERVIEW

A pilot study was conducted to develop materials for the main data collection phase. The purpose of this preliminary investigation was to assure adequate familiarity of subjects with the stimulus materials that were used later. Additional pre-testing assured that subjects understood the directions for the measures.

In the main study individuals' cognitive complexity was to be estimated, using the number of independent dimensions along which subjects perceived stimuli to vary. This estimation involved tapping the underlying dimensionality of subjects' perceptions of job titles. Then, dimensionality was to be correlated with rating accuracy to determine the predictive validity of cognitive dimensionality. Also in the main data collection phase, subjects completed a version of the REP, modified to include job titles. This REP was included so that a determination could be made whether or not dimensionality via MDS better predicted rating accuracy than did the REP. In addition, the hypothesized convergent validity between a traditional measure of cognitive complexity (dimensionality) and MDS dimensionality could be established. Because the job-titles REP was used (i.e., the content domain of the two predictors was held constant), significant differences in predictiveness between the REP (jobs) and dimensionality would suggest that the procedure rather than the content of the measure is important.

The dependent measure was differential accuracy (DA) in performance appraisal ratings. DA was determined as follows: Subjects were asked to rate the teaching effectiveness of four instructors presented on a videotape. The videotape consisted of four vignettes employed by Murphy et al. (1982). (The videotaped vignettes are described more fully in the procedures section.) Differential accuracy was assessed according to a procedure developed by Cronbach (1955) and later employed by Murphy et al. (1982). Differential accuracy scores for each subject were used in subsequent analyses.

Finally, correlations between dimensionality and the REP, between dimensionality and DA, and between the REP and DA were standardized, using Fisher's r to Z transformation. A determination whether or not dimensionality was more predictive than the REP was then made.

PILOT STUDY

Pilot Study Sample

The pilot study sample consisted of 39 (20 male and 19 female) undergraduates in psychology at a large southeastern university. A laboratory sample was employed since findings by Stone and Ruddy (1987) indicated that the dimensionality which underlies college student ratings is similar to the dimensionality of subjects drawn from neighboring communities. Extra course credit was offered to these participants.

Pilot Study Measures

The materials for the pilot study consisted of: (1) a set of 20 job titles (to be described below); (2) the job titles familiarity

questionnaire; and (3) biographical questionnaires which ask respondents for demographic information concerning themselves.

Based upon prior research (Schroder et al., 1967; Scott et al., 1975; Sechrest & Jackson, 1961; Streufert & Streufert, 1978; Streufert, 1982), cognitive dimensionality is best examined within a particular domain. Job titles and/or performance dimensions would appear to offer job-relevant content domains. However, the use of performance dimensions would impose dimensionality upon subjects. Thus, the use of job titles seems preferable.

Earlier, it was noted that Stone and Gueutal (1985) found no significant effects for trichotomized CC subgroups on job-dimensionality. One matter of interest, then, is whether the operationalization of CC accounted for Stone and Gueutal's null results for CC. To facilitate an extension of the Stone and Gueutal (1985) study, the present project will retain job titles as a stimulus set.

Job titles (n=20) that were used for this study were those selected by Stone and Gueutal (1985) in a procedure described as follows: Titles from a larger stimulus set (n=52) were originally drawn from the Dictionary of Occupational Titles (1965). To reduce their original set of titles, these researchers first determined the subjects' (88 undergraduate management students') familiarity with the target jobs. The familiarity ratings ranged from 1 ("not at all familiar") to 5 ("totally familiar"). Job titles eliciting a rating of greater than or equal to 3.0 were retained in the stimulus set. A final reduction in the number of stimulus job titles was accomplished by selecting those jobs which were "(a) both heterogeneous with respect to such criteria as job

incumbent's "collar color," employment sector, job status, and other variables, and (b) generally representative of civilian jobs" (p. 381). Retained job titles included cashier, janitor, fire fighter, telephone operator, bank teller, mail carrier, taxi driver, file clerk, accountant, short-order cook, actor, assembly-line foreman, machine operator, elementary school teacher, flight attendant, waiter/waitress, construction worker, tailor, lawyer, and retail store manager. The job titles were randomly ordered on the pilot study questionnaire.

Directions for the pilot study required each subject to rate his/her familiarity with the characteristics of the work activities of incumbents. The purpose of this phase of the project was to assure that subjects were sufficiently familiar with all of the items used in the questionnaires. This measure is included in Appendix A. The ratings scales ranged from 1 ("not at all familiar") to 5 ("totally familiar").

A demographic questionnaire (Appendix B) also was administered to subjects. This biographical questionnaire permitted the examination of the potential effects on familiarity ratings of work history and other demographic variables.

Pilot Study Procedure

The research was conducted in accordance with the principles for the treatment of human subjects prescribed by the American Psychological Association. Informed consent forms were completed by all participants. Subjects were reminded that their participation was voluntary and that they were free to withdraw from the study at any time. Names of participants wishing further information about the project were recorded.

Subjects completed a biographical questionnaire and the familiarity rating questionnaire. Subjects for the pilot study were debriefed and thanked for their participation.

Job title familiarity ratings were analyzed to estimate whether or not the stimulus words for the similarity measure would be sufficiently familiar to subjects. As in Stone and Gueutal (1985), all job titles met the criteria of a 3.0 mean familiarity rating and were retained in the stimulus set. descriptive statistics for this measure are contained in Appendix A.

MAIN DATA COLLECTION PHASE

Main Data Collection Sample

Three-hundred-and-five undergraduates who were enrolled in introductory psychology completed the main data collection phase. Ninety-five percent of the subjects have held paying jobs. Fifty-three different job titles were represented by subjects' occupations. Subjects were on average 18.893 years of age (range=17 to 31). Most participants had worked at paying jobs (M=2.164 years, range= 0 to 14 years). Of the original subject pool (n=344), 25 were dropped from the study because they did not return for the second session. Thirteen were dropped because they failed to complete one of the hypothesized predictor measures. One subject was dropped from the study because that subject's data prompted a fortran warning during multidimensional scaling. Extra course credit was provided to participants.

Main Data Collection Phase Measures

The predictor measures for this phase of the study included the Job Similarity Measure and the Modified Job REP. These appear in Appendices C and D and are described more fully below. A biographical questionnaire (Appendix E) also was included to permit the assessment of effects of demographic variables such as work history, sex, etc. The criterion measures were performance measures identical to those used by Murphy et al. (1982). These questionnaires appear in Appendix F and are also described more fully below.

The Job Similarity Measure was identical to that employed by Stone and Gueutal (1985). Instructions for the questionnaire directed subjects to rate the similarity of all possible pairs of listed job titles. Specifically, when making similarity ratings, subjects were asked to consider the job duties for each job title. Subjects were not given a dimension on which to rate the comparability of each pair of words. Instead, they imposed their own underlying dimensions. Each pair of words was accompanied by a 6-point similarity scale. Anchors ranged from 1 ("not at all similar") to 6 ("almost completely similar"). Word pairs were randomly ordered within the similarity questionnaire. Although the 200 pairs that made up the list included only 190 unique combinations, all 200 word-pairs were used in each set. The inclusion of duplicate pairs allowed for the assessment of the reliability of the measures. This strategy is identical to that employed by Stone and Gueutal (1985).

To determine the relative contribution of the dimensionality approach, a REP-type questionnaire was developed for use with job titles. For this measure, subjects generated constructs that underlie their

perceptions of jobs. They were presented with lists of triads drawn randomly from the list of twenty job titles in the pilot study (used for the similarity measure). Subjects decided what made any two of the words in a particular triad alike and yet different from the third word. Subjects indicated this similarity by selecting a descriptive word. Subjects also indicated the polar opposite of each descriptive word. For example, one subject may have perceived the jobs, telephone operator/bank teller/construction worker, using the pair of words "automated" versus "manual". Such a bipolar pair could then be used in the second part of the grid task, which involved assigning a numerical value to each job title for each pair of bipolar opposites. Thus, for example, the above-mentioned hypothetical subject may have rated the job, CASHIER, on a scale of -3 to +3 for a total of ten bipolar opposites that were unique to each subject.

Grids were scored according to the procedure outlined by Bieri (1966) and described below. The rating in each row was compared to the rating directly below it (for the same job) in the other rows on the matrix. A score of one was given each time there was agreement. This matching procedure was carried out for all unique row comparisons (900 comparisons in a 20 x 10 matrix). A high REP score indicates low complexity. In other words, a high score indicates that the subject used the same numerical rating frequently. Such a rater would employ construct dimensions in an identical manner.

Regarding the performance measures (Appendix F), the first set of performance-related questions asked subjects to rate the frequency with which each of twelve behaviors occurred on videotaped performances of

instructors. (For example, "Lecturer spoke fast," "Lecturer gave clear answers to questions," "Lecturer spoke in a monotone for a sustained period.") Responses were anchored on a seven-point Likert-type scale (1="never," 2="almost never," 3="a few times," 4="about half the time," 5="often," 6="most of the time," 7="all of the time"). The second set of questions asked that subjects rate the lecturer whom they had just observed for such dimensions as thoroughness of preparation, grasp of material, organization and clarity, speaking ability, overall rating, etc. Responses to these questions were anchored on a five-point Likert scale (1="very bad," 2="poor," 3="average," 4="good," 5="very good").

Main Data Collection Phase Procedures

This phase consisted of two sessions, the first lasting about an hour to an hour and one-half and the second lasting about 30-40 minutes. At the first session, each subject completed an informed consent form, the Job Similarity Measure, the Job REP questionnaire, and the biographical questionnaire. All subjects answered the questionnaires in the same order because the presentation of the REP Grid task first could have primed the subjects for the similarity task. To minimize possible fatigue effects, the experimenter told subjects that they could take a quiet break from the task if they felt their attention diminishing.

Approximately two weeks later, subjects returned to view four videotaped lectures. The lectures were selected from the eight vignettes developed by Murphy et al. (1982). Scripts for the videotapes (one concerning crowding and stress and the other self-fulfilling prophecy) were developed by holding constant the content across the two same-topic

lectures. However, the thoroughness and organization of the lectures and the clarity of answers to questions varied both between and within the same-content videotapes. For example, one script concerning crowding and stress contained a good, well-organized lecture, but poor answers to questions, while the other contained a poorly organized lecture but good answers (Murphy et al., 1982). Lecturers were drama students from a Houston-area university. Low, low-moderate, moderate, and moderate-high levels of performance were represented. True scores were established for the videotapes by Murphy et al. (1982), modifying a procedure developed by Borman (1977) and described more fully by Murphy et al. In essence, Murphy asked "expert raters" to generate true scores by having them rate the videotaped performances. These true scores (mean performance rating across all the experts) facilitated the calculation of accuracy scores that were used in the analyses.

Rating instructions informed subjects that they were participating in a teacher evaluation study and that their ratings would be used for research and feedback purposes only. Subjects were told that their ratings would not affect the employment status and salary of the ratees and that individual responses would be confidential. Subjects were told also that shortly they would view four instructors on the videotape, each one at a time. After subjects viewed each instructor, the experimenter would stop the videotape and the subjects would rate the person they had just observed. This aspect of the procedure was intended to minimize potential memory effects. Subjects were asked to read the cover page of the rating booklet and to familiarize themselves with the rating questionnaire.

Following the rating task, subjects were fully debriefed. Instructions for the rating task had suggested to subjects that ratings would be for research and feedback purposes only and would not affect ratees' employment status or salaries. At the debriefing, subjects were told that, although the instructions suggested the ratees were teachers, the persons they had observed were actually actors. Subjects were asked not to discuss the nature of the experiment with anyone. Names of those subjects wishing further information about the research were recorded. Subjects completed extra credit point sheets and were thanked for their participation.

RESULTS

RELIABILITY ESTIMATES

Scorer reliability for the REP Grid measure was assessed by randomly selecting ten grids for rescoring by an independent rater. The interrater reliability estimate was .96.

A reliability estimate for judgments indexed by the Job Similarity measure was derived by correlating ratings on the ten pairs of duplicate items. These correlations were calculated separately for each subject. Individual subjects' correlations were transformed by Fisher's r to Z transformation. The average Z transformed value was .829 ($s.d.=.52$). This index of subject consistency compares favorably with prior consistency estimates for this measure (average $Z=.76$) by Stone and Gueutal (1985).

DERIVING DIMENSIONALITY

In order to examine dimensionality's predictive validity, it was necessary to derive subjects' perceived dimensions of job titles. Following is a description of the results of this preliminary analysis.

Dimensionality was assessed by submitting pair-wise similarity ratings for the 190 unique similarity items to non-metric, individual-differences multidimensional scaling (INDSCAL algorithm). Program option specifications were as follows: level = ordinal, similar, shape = symmetrical, condition = matrix, model = INDSCAL, maxdim = 6, mindim = 2, iterations=10, converge = .001, untie. It should be noted

that maxdim and mindim are set at the maximum and minimum (respectively) allowed by the INDSCAL program. In addition, the iterations required to attain convergence at .001 were always less than ten. First, the overall (group) MDS solution will be reported.

As indicated earlier, INDSCAL employs a least-squares criterion for fitting the data to the model. In other words, the iterative process attempts to keep S-STRESS (overall "badness of fit") at a minimum. The program iterates until some specified level of S-STRESS reduction is achieved. Program output indicates R^2 as well as Kruskal's STRESS1, which is another "badness of fit" measure averaged across subjects' matrices. According to Davison (1983), the major difference between S-STRESS and STRESS1 is that S-STRESS uses squared distances and squared disparities while STRESS1 does not square the distances and disparities. The results indicated that a two-dimensional model accounts for .64 of the variance (STRESS1=.245), a three-dimensional model for .67 of the variance (STRESS1=.184), a four-dimensional model for .70 of the variance (STRESS1=.137), a five-dimensional model for .73 of the variance (STRESS1=.113), and a six-dimensional model for .74 (STRESS1=.096). These data are presented in tabular format in Table 1 and in graphic format in Figure 1. The data reflect values (variance accounted for) which compare favorably with those Young and Lewyckyj (1979) termed "moderately good" (p. 103), but not excellent. INDSCAL also identifies the importance of each dimension averaged across subjects. These data as well as the stimulus coordinates for the four-dimensional solution are contained in Table 2.

One convention (Kruskal & Wish, 1978) which guides the selection of the appropriate dimensionality per number of stimuli is that I (the number of stimulus objects) should be greater than $4R$ (where R is the number of dimensions). In other words, a six-dimensional solution may require approximately 24 stimulus objects, while a four-dimensional solution may require approximately 16 stimulus objects. The present data (with 20 stimulus objects) satisfies this criterion for the four-dimensional solution.

More importantly, a determination of the dimensionality reflected by the data depends also on the satisfaction of a number of other criteria. The first is whether or not the addition of a particular dimension contributes to a substantial increment in R^2 . Note that r for the group solution is calculated by the following equation:

$$r = \frac{\sum_{(i,j,s)}(\delta_{ijs}^* - \delta_{...}^*)(\hat{\delta}_{ijs}^* - \hat{\delta}_{...}^*)}{[\sum_{(i,j,s)}(\delta_{ijs}^* - \delta_{...}^*)^2 \sum_{(i,j,s)}(\hat{\delta}_{ijs}^* - \hat{\delta}_{...}^*)^2]^{1/2}} \quad [9]$$

where δ^* is the grand mean of the actual scalar products and $\hat{\delta}^*$ is the grand mean of the estimated scalar products, ij refers to the stimulus pair, and s refers to the subject (Davison, 1983). In other words, δ_{ij} refers to the proximity (distance) measurement of stimulus pair (i,j) . A proximity measure is an index of the degree of similarity of pairs of objects. But INDSCAL provides more than a group stimulus space. As indicated in the introduction of this dissertation, INDSCAL also provides a direct means of assessing the importance of various recovered dimensions for individual subjects. These importance weights are computed by the

TABLE 1

Stress and R² for Dimensionality Two¹ to Six (INDSCAL)

Dimensionality	Stress	R ²	R ² for Each Dimension as a function of Dimensionality					
			Dimension					
			1	2	3	4	5	6
2	.245	.637	.350	.287				
3	.184	.666	.243	.218	.206			
4	.137	.704	.205	.181	.174	.143		
5	.113	.726	.185	.172	.147	.128	.093	
6	.096	.742	.168	.164	.125	.098	.096	.091

¹Two is the minimum dimensionality retrievable under INDSCAL (SAS Version).

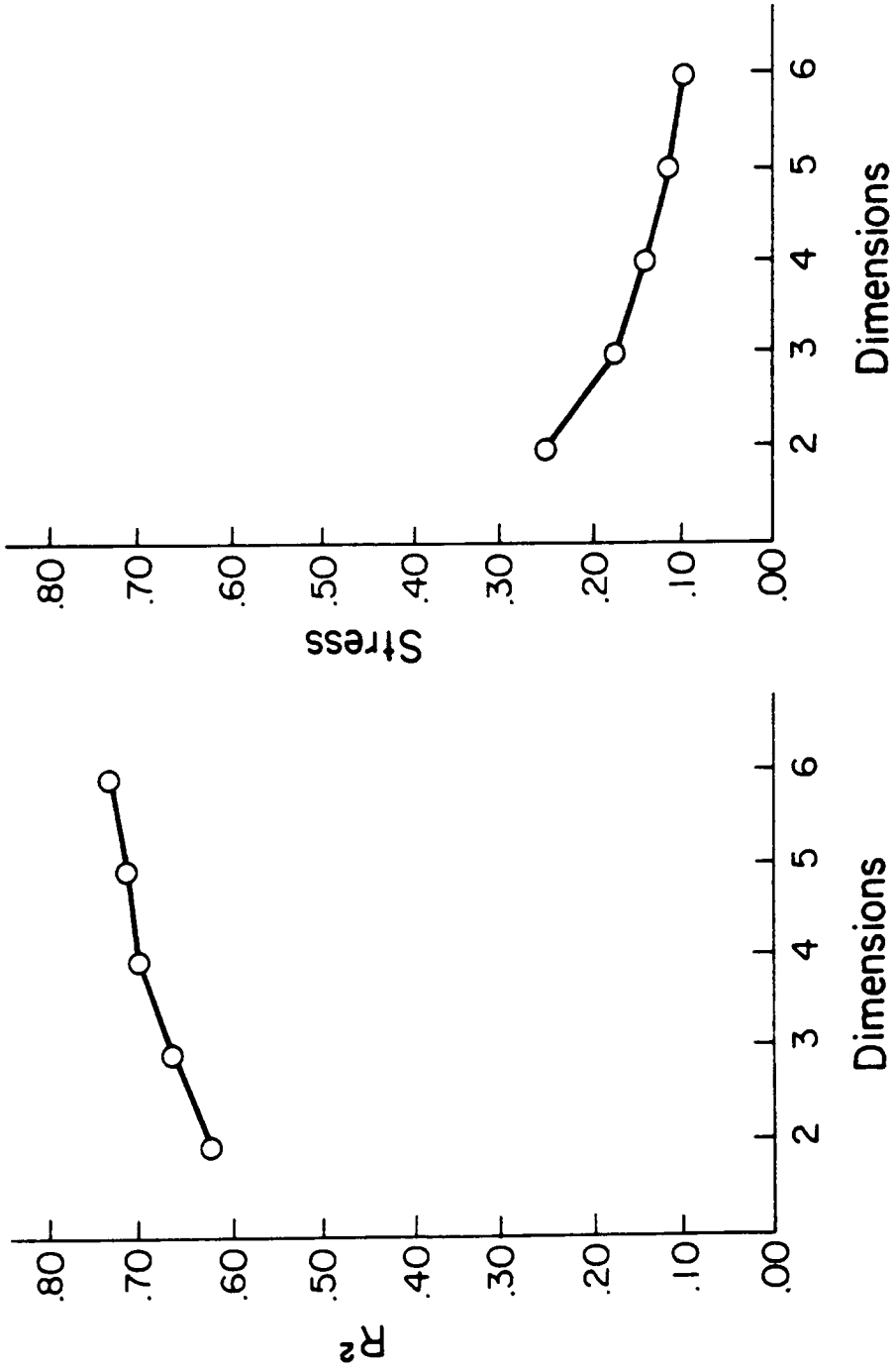


Figure 1: R² and Stress as a Function of Dimensionality

TABLE 2

Stimulus Coordinates: Overall Solution (INDSCAL)

	Dim. 1	Dim. 2	Dim. 3	Dim. 4
Cashier	-0.7107	-1.4787	-0.9338	0.1874
Retail Mgr.	0.9179	-1.2090	-0.6739	-0.9854
Bank Teller	-0.3921	-1.1328	-1.4195	0.5982
Waiter	-0.4785	-1.0359	1.0723	0.9322
Cook	-1.4438	-0.9054	0.7681	-0.5960
Tailor	0.2856	-0.9645	0.8882	-1.5965
Actor	1.4734	-0.2234	1.6309	0.9317
File Clerk	0.2103	0.5466	-1.5393	0.4589
Lawyer	2.0704	0.0571	-0.5335	0.7375
Teacher	1.6552	0.3144	0.7455	-0.1756
Tel. Op.	-0.4855	0.5923	-1.0409	0.9007
Taxi Driv.	-1.6196	0.3028	0.3778	0.7758
Firefighter	0.3490	2.2694	0.5504	0.0331
Const. Work	-0.4173	1.4743	0.2744	-1.5891
Mail Carrier	-0.6023	1.3408	-0.3423	1.3453
Machine Op.	-1.2478	0.5309	-0.7065	-1.2603
Accountant	0.9779	-0.9189	-1.4132	0.3367
Assembly Frmn.	0.4091	0.2979	-0.4236	-1.9071
Flight Attend.	-0.1503	-0.6380	1.0704	1.3692
Janitor	-0.8009	0.7802	1.6484	-0.4967
Variance	0.2051	0.1812	0.1742	0.1431

following equation:

$$r_s = \frac{\Sigma_{(i,j)}(\delta_{ijs}^* - \delta_{..s}^*)(\hat{\delta}_{ijs}^* - \hat{\delta}_{..s}^*)}{\{[\Sigma_{(i,j)}(\delta_{ijs}^* - \delta_{..s}^*)^2][\Sigma_{(i,j)}(\hat{\delta}_{ijs}^* - \hat{\delta}_{..s}^*)^2]\}^{1/2}} \quad [10]$$

where δ^* and $\hat{\delta}^*$ are the mean actual and estimated scalar products for the particular subject, s , (Davison, 1983). It should be noted that r , the correlation between each subject's actual and estimated scalar products, indicates the strength of the relationship between the dimension and the subject's matrix.

For the group space, R^2 is plotted against the number of dimensions. An "elbow" in the ascent of the plotted line indicates the dimensionality beyond which additional dimensions are not of much importance in interpreting the group space. The plot for the present study is presented in Figure 1. This determination is, by necessity, a matter of judgment since there are no tables for INDSCAL (Davison, 1983; Kruskal & Wish, 1978; Schiffman, Reynolds, & Young, 1981). Although Monte Carlo tables have been developed for statistical hypothesis testing of more traditional approaches to MDS, there are no such tables for INDSCAL. Nor is there a convention such as in factor analysis. An additional limitation is that techniques such as policy capturing via stepwise regression requires an external criterion. Thus, while policy capturing may provide additional information about the relative importance of particular dimensions in the prediction of rater accuracy, the technique is not appropriate for the "internal" statistical hypothesis testing of similarity dimensions (Davison, 1983). The plot of R^2 against the number

of dimensions appears to favor a four dimensional solution. However, it should be noted that at either three or four dimensions R^2 and Stress are somewhat disappointing.

In addition to the criterion of proportion of variance accounted for, other criteria are important. For example, as Shepard (1972) has maintained, parsimony, stability, and visualizability are important. Generally, a trade-off arises because when dimensions are added fit improves at the expense of parsimony. The parsimony criterion would suggest that, since little additional variance is accounted for by the addition of the fifth and sixth dimensions, the group data is best described by a four-dimensional solution. Indeed, Shepard contends that except when using INDSCAL (as the present study does) dimensionality should rarely exceed two or three dimensions. The stimulus coordinates and variance accounted for by each factor are indicated in Table 2.

Because they maximize fit, data reduction techniques such as MDS and factor analysis are susceptible to shrinkage. Accordingly, an assessment of the solution's stability, the second of Shepard's (1972) criteria, is important. This stability may be assessed by randomly dividing the data into four subsets and comparing the results of the four analyses. Therefore, four subsets, each containing one-fourth of the subjects' matrices, were extracted from the data set. These subsets were then analyzed separately by INDSCAL, using the same program options that were used for the full data set. Stimulus coordinates for these data are reported in Tables 3-6. The results appear to suggest that the original solution is stable. A four-dimensional solution again appears to describe the data ($R^2 = .717$, STRESS1=.134; $R^2 = .653$, STRESS1=.148; $R^2 = .737$,

STRESS1=.132; and $R^2 = .720$, STRESS1=.135 for the four subsets respectively). These results are presented in Table 7. Figures 2 and 3 illustrate R^2 plotted against dimensionality for this subset analysis. However, when coefficients of congruence are examined for the two subsets, stability seems less certain. The Job Title Stimulus Coordinates were used to determine coefficients of congruence between subsets A, B, C, and D for each dimension. These data are presented in Tables 8-12.

Coefficients of congruence (Burt, 1948; Wrigley & Neuhaus, 1955) work directly from the scores rather than from the deviations (Cattell, 1978). Cattell calls the procedure "joint mean and deviation factoring," which retains information concerning the "variation about the means and the absolute means themselves" (p.468). The equation for this statistic is found in Gorsuch (1983):

$$C_{12} = \frac{\sum P_{v1}P_{v2}}{\sqrt{\sum P_{v1}^2} \sqrt{\sum P_{v2}^2}} \quad [11]$$

"where C_{12} is the coefficient of congruence between factor one and factor two, P_{v1} are the factor loadings for the first factor and P_{v2} are the factor loadings for the second factor" (p. 285). The formula may also be applied to stimulus coordinates in MDS.

Coefficients of congruence index the extent to which a factor or dimension is stable (i.e., is reproduced) by another. Consider the dimensional solution illustrated in Table 8.

There would be evidence of stability for dimension one if the coefficients in column 1A were high (in the high .90 range) for one of the dimensions in each of subsets B, C, and D, but low for the other dimension within each subset. In Table 8, for example, column 1A should indicate numbers in the high .90 range rather than -.87, -.83, and .94. Conversely, coefficients of congruence for 1A with 2B, 2C and 1D should all be much lower. In the present study, changing the dimensionality did not substantially improve stability.

The third of Shepard's criteria is visualizability (interpretability). A visual inspection of the three and four dimensional solutions is not particularly enlightening. And, as indicated earlier, since external criteria were unavailable, statistical relationships between the captured dimensions and particular external constructs could not be empirically demonstrated.

In light of the aforementioned instability of the individual-differences scaling solution, the data were unsuitable for the tests of Hypotheses 1, 2, and 3. Therefore, the analyses did not proceed to the tests of these hypotheses. Instead, the data were submitted to group multidimensional scaling (ALSCAL or Alternating Least Squares Scaling). Program options were level=ordinal, similar, shape=symmetrical, condition=matrix, model=Euclid,maxdim=6, mindim=1, iterations=10, converge=.001, untie.

Results revealed that a one-dimensional solution accounted for .579 of the variance (STRESS1=.373), a two-dimensional solution for .607 of the variance (STRESS1=.249), a three-dimensional solution

TABLE 3

Stimulus Coordinates: Subset A (INDSCAL)

	Dim. 1	Dim. 2	Dim. 3	Dim. 4
Cashier	-0.6245	1.2302	-1.2014	0.5032
Retail Mgr.	-0.2179	-0.6645	-1.8402	-0.0607
Bank Teller	-1.1455	0.7552	-0.8372	1.1625
Waiter	-0.8364	0.9189	0.2477	-1.1448
Cook	0.4267	1.5233	-0.4688	-1.0516
Tailor	0.6493	-0.1298	-1.4118	-1.3439
Actor	-0.9841	-1.2069	0.5639	-1.6701
File Clerk	-0.2365	-0.4549	-0.0526	1.7253
Lawyer	-1.3280	-1.9705	-0.0520	0.2995
Teacher	-0.1718	-1.6497	0.2263	-0.7973
Tel. Op.	-0.0471	0.3123	0.4319	1.3956
Taxi Driv.	0.1077	1.6425	1.0568	0.1011
Firefighter	0.8102	-1.0343	1.8279	0.2197
Const. Work.	2.1461	-0.3064	0.3794	-0.2798
Mail Carrier	0.0147	0.3513	1.6669	1.1372
Machine Op.	1.6059	0.8934	-0.2243	0.7314
Accountant	-1.3479	-0.4436	-1.1454	0.9814
Assembly Frmn.	1.2847	-0.7055	-1.0450	0.3441
Flight Attend.	-1.2365	0.5373	0.8046	-0.8555
Janitor	1.1307	0.4017	1.0731	-1.3971

TABLE 4

Stimulus Coordinates: Subset B (INDSCAL)

	Dim. 1	Dim. 2	Dim. 3	Dim. 4
Cashier	0.3401	1.3399	0.6699	1.2448
Retail Mgr.	-1.1773	0.9337	-0.1445	1.0986
Bank Teller	0.3054	1.6295	1.0394	0.2887
Waiter	0.4152	-0.7986	1.0605	1.2019
Cook	1.4921	-0.2337	-0.3312	1.3557
Tailor	-0.5230	-0.3084	-1.1178	1.6715
Actor	-1.3451	-1.7526	0.8217	0.0876
File Clerk	-0.0671	1.0849	0.7011	-1.2201
Lawyer	-1.9896	0.2041	0.4678	-0.9782
Teacher	-1.5084	-1.0689	-0.1278	-0.2319
Tel. Op.	0.7941	0.5806	0.8990	-1.0068
Taxi Driv.	1.5627	-0.7359	0.4760	-0.0816
Firefighter	0.0066	-0.9835	-0.8053	-1.9818
Const. Work.	0.4275	-0.1225	-1.9900	-0.7668
Mail Carrier	1.0529	-0.1683	0.6934	-1.5154
Machine Op.	1.0470	0.9659	-1.3613	-0.1931
Accountant	-1.2240	1.3922	0.5493	-0.0878
Assembly Frmn.	-0.4560	0.5823	-1.7798	0.2475
Flight Attend.	0.1403	-1.0157	1.3814	0.7956
Janitor	0.7065	-1.5251	-1.1007	0.0716

TABLE 5

Stimulus Coordinates: Subset C (INDSCAL)

	Dim. 1	Dim. 2	Dim. 3	Dim. 4
Cashier	0.5131	1.6877	0.5497	0.1336
Retail Mgr.	0.9807	0.5581	-0.6234	-1.5093
Bank Teller	1.0851	1.3815	0.6202	0.2593
Waiter	-1.0951	1.2502	-0.4441	0.6526
Cook	-1.2412	1.1559	0.8089	-0.5761
Tailor	-0.8180	0.6324	-0.4036	-1.8103
Actor	-0.5468	-0.2756	-2.3876	0.6111
File Clerk	1.3246	-0.0064	0.9559	0.3631
Lawyer	1.6105	-0.1857	-1.5142	0.2670
Teacher	0.0957	-0.7601	-1.6498	-0.4945
Tel.Op.	0.9010	-0.5724	0.5997	0.9874
Taxi Driv.	-0.8931	0.0998	0.6307	1.5057
Firefighter	-0.5093	-2.2716	-0.2778	0.4578
Const. Work.	-0.7921	-1.5376	0.8181	-1.1141
Mail Carrier	0.1803	-0.7879	0.6939	1.8077
Machine Op.	-0.1493	-0.4390	1.6575	-0.7178
Accountant	1.6743	0.8743	-0.2449	-0.2149
Assembly Frmn.	0.4135	-0.9377	-0.0029	-1.7396
Flight Attend.	-0.9994	0.6321	-0.7493	1.1100
Janitor	-1.7344	-0.5520	0.9629	0.0216

TABLE 6

Stimulus Coordinates: Subset D (INDSCAL)

	Dim. 1	Dim. 2	Dim. 3	Dim. 4
Cashier	0.5140	-1.4909	-0.5167	-0.8782
Retail Mgr.	-0.7631	-0.7341	0.3722	-1.6712
Bank Teller	0.1284	-1.5394	-0.9508	-0.5289
Waiter	0.7025	0.7147	-1.3615	-0.5609
Cook	1.4970	0.3097	0.1858	-1.1682
Tailor	-0.9615	0.3475	1.5558	0.0818
Actor	-0.9964	1.8103	-1.1437	-0.3810
File Clerk	-0.7520	-1.1046	-0.0733	1.1492
Lawyer	-2.1488	0.0708	-0.7694	0.3149
Teacher	-1.2778	1.1441	0.0246	-0.8875
Tel.Op.	0.2485	-1.0539	-0.2868	1.0704
Taxi Driv.	1.6510	-0.0153	-0.4546	0.6725
Firefighter	-0.1030	1.3711	0.6160	1.9339
Const. Work	0.5640	0.4568	1.9065	0.8115
Mail Carrier	0.4062	-0.1243	-0.5380	1.9754
Machine Op.	1.0295	-0.9062	1.4775	0.3462
Accountant	-1.2828	-1.2289	-0.7672	-0.3958
Assembly Frmn.	-0.1443	-0.2555	1.5654	-1.3306
Flight Attend.	0.5003	0.7707	-1.4949	-0.3735
Janitor	1.1883	1.4575	0.6533	-0.1801

TABLE 7
 Stress and R² for Dimensionality by Subset
 (INDSCAL)

Subset	Dimension	Stress	R ²
A	2	.236	.663
	3	.178	.685
	4	.134	.717
	5	.111	.733
	6	.094	.754
B	2	.265	.582
	3	.199	.609
	4	.148	.653
	5	.121	.681
	6	.104	.695
C	2	.238	.652
	3	.175	.697
	4	.132	.737
	5	.107	.760
	6	.091	.778
D	2	.244	.653
	3	.178	.680
	4	.135	.720
	5	.109	.753
	6	.092	.761

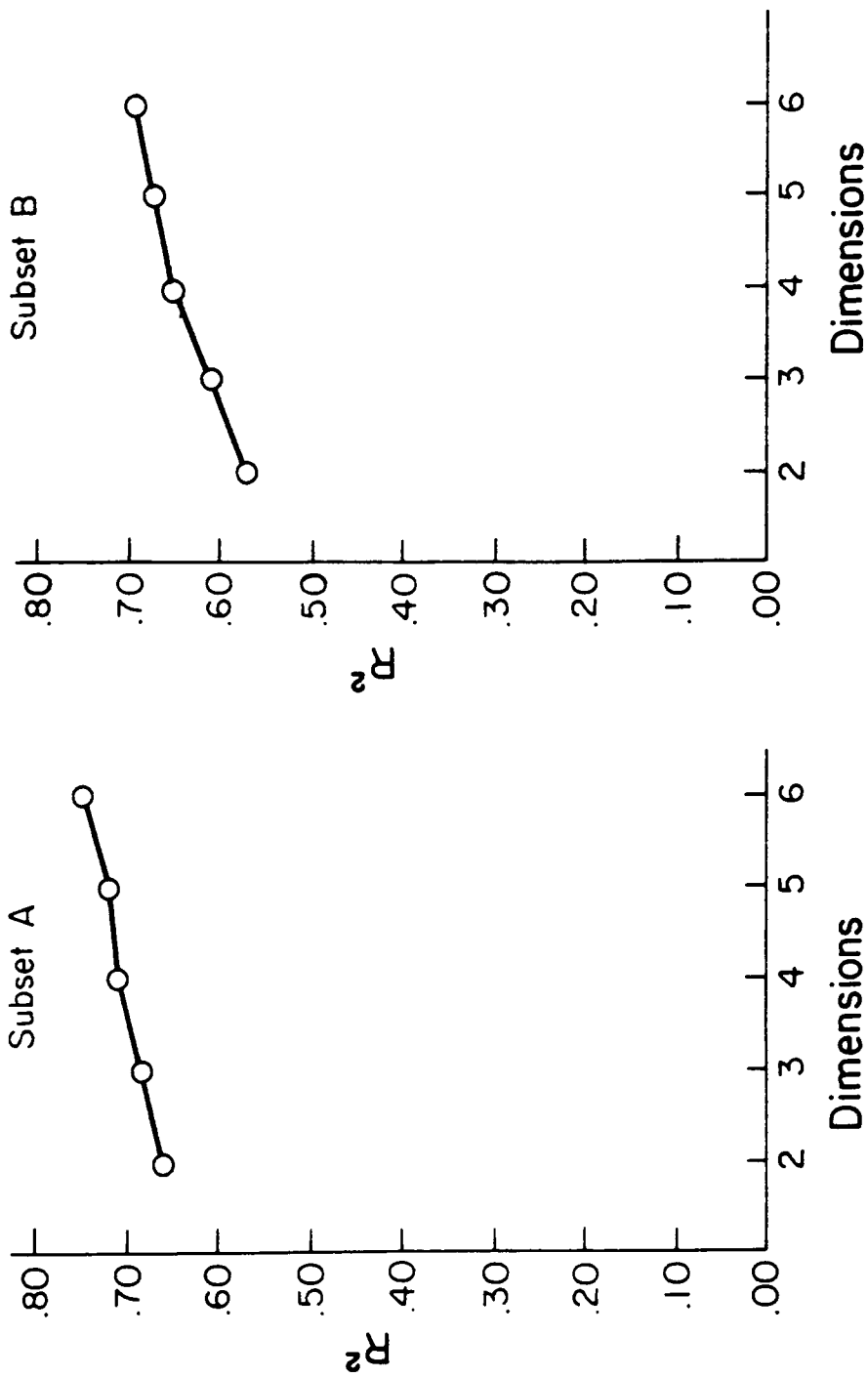


Figure 2: R^2 as a Function of Dimensionality (INDSCAL)

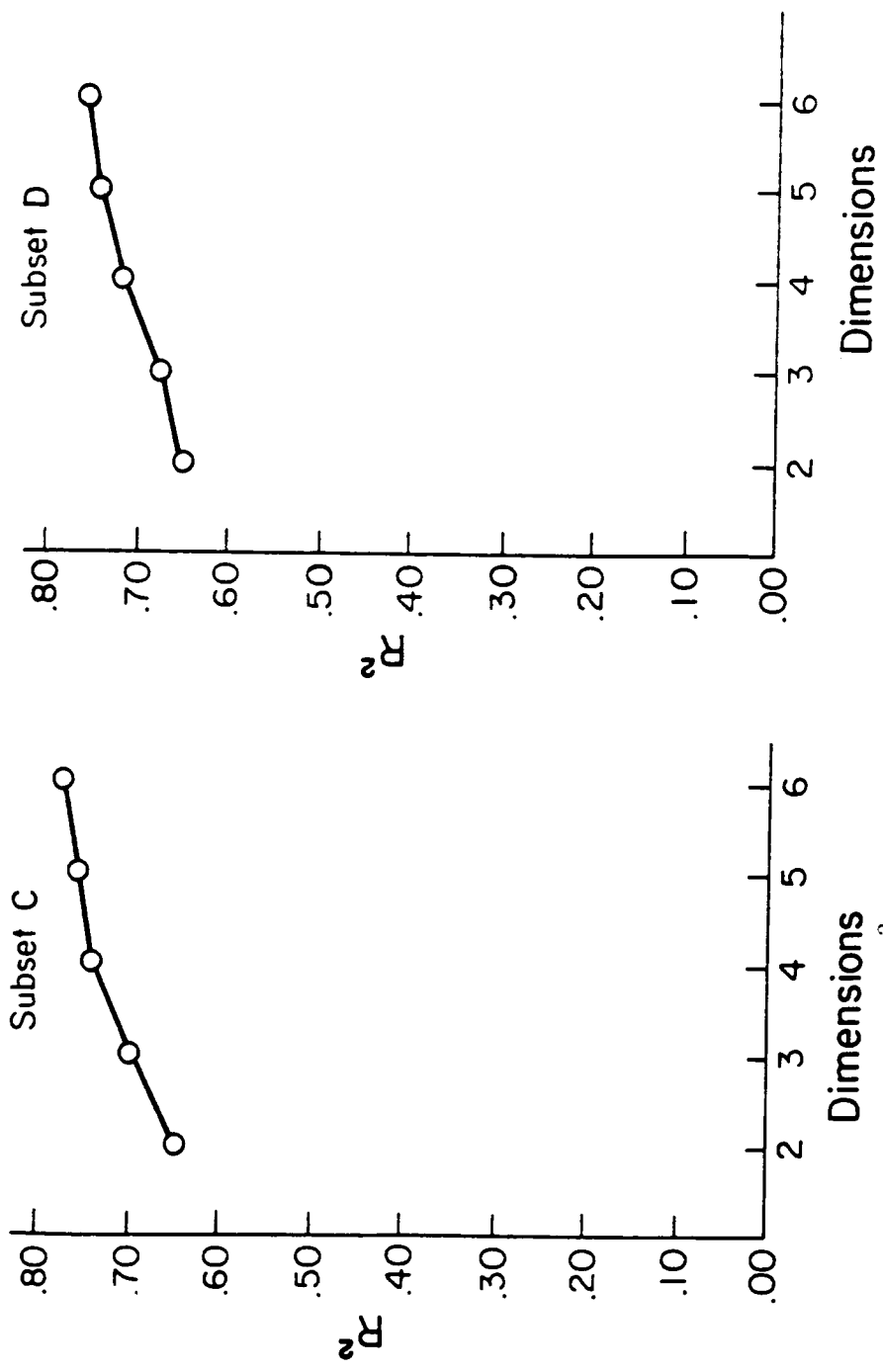


Figure 3: R^2 as a Function of Dimensionality (INDSCAL)

TABLE 8
Coefficients of Congruence
Stimulus Coordinates for Two-Dimensional Solution (INDSCAL)

Dim	1A	2A	1B	2B	1C	2C	1D	2D
1A	1.00							
2A	-0.03	1.00						
1B	-0.87*	-0.35	1.00					
2B	-0.45	0.89*	0.05	1.00				
1C	-0.83*	0.54*	0.57*	0.83*	1.00			
2C	-0.50*	-0.75*	0.83*	-0.45	0.04	1.00		
1D	0.34	-0.84*	-0.07	-0.88*	-0.71*	0.31	1.00	
2D	0.94*	0.18	-0.92*	-0.25	-0.72*	-0.62*	0.12	1.00

*P < .05

TABLE 9
 Coefficients of Congruence
 Stimulus Coordinates for Three-Dimensional Solution (INDSCAL)

Dim	1A	2A	3A	1B	2B	3B	1C	2C	3C	1D	2D	3D
1A	1.00											
2A	0.02	1.00										
3A	-0.18	0.05	1.00									
1B	-0.41	-0.86*	-0.21	1.00								
2B	0.85*	-0.47*	-0.06	0.03	1.00							
3B	0.36	0.16	-0.94*	-0.05	0.11	1.00						
1C	-0.51*	0.72*	0.52*	-0.53*	-0.74*	-0.45	1.00					
2C	0.83*	0.53*	-0.22	-0.77*	0.45	0.47	-0.07	1.00				
3C	-0.17	0.24	-0.87*	0.08	-0.35	0.79*	-0.12	0.08	1.00			
1D	-0.65*	0.54*	0.66*	-0.34	-0.76*	-0.62*	0.95*	-0.31	-0.24	1.00		
2D	0.51*	0.81*	-0.34	-0.83*	0.01	0.58*	0.20	0.88*	0.38	-0.05	1.00	
3D	0.58*	-0.02	0.67*	-0.41	0.61*	-0.50*	0.00	0.39	-0.85*	0.02	0.04	1.00

*P < .05

TABLE 10
Coefficients of Congruence
Stimulus Coordinates for Four-Dimensional Solution (INDSCAL)

Dim	1A	2A	3A	4A	1B	2B	3B	4B	1C	2C	3C	4C	1D	2D	3D	4D
1A	1.00															
2A	0.10	1.00														
3A	0.14	0.01	1.00													
4A	-0.08	0.04	-0.08	1.00												
1B	0.42	0.87*	0.35	0.13	1.00											
2B	-0.12	0.14	-0.66*	0.7*	-0.01	1.00										
3B	-0.90*	0.16	0.11	0.19	-0.06	0.07	1.00									
4B	-0.16	0.41	-0.64*	-0.54*	0.01	0.03	0.03	1.00								
1C	-0.44	-0.40	-0.44	0.76*	-0.49*	0.76*	0.31	-0.30	1.00							
2C	-0.59*	0.50*	-0.59*	-0.07	0.05	0.37	0.53*	0.76*	0.12	1.00						
3C	0.53*	0.68*	0.03	0.47	0.81*	0.43	-0.28	-0.10	-0.09	0.02	1.00					
4C	-0.47*	0.26	0.71*	0.22	0.33	-0.25	0.73*	-0.41	-0.04	0.01	0.01	1.00				
1D	0.43	0.87*	0.32	-0.09	0.94*	-0.14	-0.13	0.17	-0.64*	0.08	0.70*	0.25	1.00			
2D	0.18	-0.31	0.57*	-0.80*	-0.14	-0.96*	-0.21	-0.05	-0.71*	-0.44	-0.50*	0.07	0.01	1.00		
3D	0.91*	-0.11	-0.19	-0.03	0.12	0.08	-0.96*	-0.05	-0.20	-0.50*	0.39	-0.73*	0.11	0.03	1.00	
4D	0.22	-0.04	0.70*	0.40	0.31	-0.13	0.02	-0.80*	0.00	-0.58*	0.29	0.52*	0.08	0.06	0.07	1.00

*P < .05

TABLE 11
Coefficients of Congruence
Stimulus Coordinates for Five-Dimensional Solution (INDSCAL)

Dim	1A	2A	3A	4A	5A	1B	2B	3B	4B	5B	1C	2C	3C	4C	5C	1D
1A	1.00															
2A	-0.10	1.00														
3A	-0.07	-0.02	1.00													
4A	0.00	-0.08	0.05	1.00												
5A	-0.11	-0.06	0.13	0.01	1.00											
1B	0.80*	0.04	-0.09	-0.49*	0.32	1.00										
2B	-0.26	0.63*	-0.42	-0.49*	0.32	-0.04	1.00									
3B	0.44	-0.56*	-0.50*	0.23	0.40	0.06	-0.12	1.00								
4B	0.01	-0.09	0.75*	-0.13	0.64*	-0.08	-0.06	-0.04	1.00							
5B	0.35	0.55*	0.12	0.62*	0.05	0.01	-0.02	0.01	0.01	1.00						
1C	0.37	-0.43	-0.84*	-0.05	-0.11	0.27	0.04	0.77*	-0.60*	-0.26	1.00					
2C	-0.53*	0.61*	-0.32	-0.15	0.44	-0.46	0.89*	-0.15	-0.03	0.09	-0.12	1.00				
3C	0.80*	0.38	0.03	-0.03	0.18	0.64*	0.15	0.20	0.23	0.66*	0.02	-0.09	1.00			
4C	0.14	0.56*	-0.33	-0.36	-0.74*	0.51*	0.31	-0.47	-0.64*	0.06	0.10	0.07	0.13	1.00		
5C	0.05	-0.16	0.11	-0.91*	0.21	0.41	0.33	-0.05	0.40	-0.68*	0.02	0.03	0.03	0.02	1.00	
1D	-0.50*	0.85*	0.25	-0.07	-0.02	-0.29	0.50	-0.79*	0.06	0.34	-0.70*	0.61*	-0.02	0.35	-0.13	1.00
2D	0.86*	0.18	0.17	0.19	-0.32	0.70*	-0.35	0.05	-0.01	0.62*	-0.00	-0.55*	0.79*	0.31	-0.22	-0.15
3D	-0.25	-0.22	0.44	0.75*	0.42	-0.69*	-0.40	0.13	0.44	0.35	-0.37	-0.03	-0.16	-0.76*	-0.53*	-0.03
4D	-0.00	-0.11	0.78*	-0.43	0.27	0.14	-0.11	-0.34	0.84*	-0.27	-0.61*	-0.19	0.08	-0.30	0.64*	0.06
5D	-0.05	0.35	-0.30	-0.11	0.11	0.00	0.55*	0.03	-0.11	0.11	0.11	0.49	0.14	0.23	0.06	0.07

*p < .05

TABLE 11 (cont'd)
 Coefficients of Congruence
 Stimulus Coordinates for Five-Dimensional Solution (INDSCAL)

Dim	2D	3D	4D	5D
1A				
2A				
3A				
4A				
5A				
1B				
2B				
3B				
4B				
5B				
1C				
2C				
3C				
4C				
5C				
1D				
2D	1.00			
3D	-0.13	1.00		
4D	0.01	0.11	1.00	
5D	-0.08	-0.06	-0.04	1.00

*p < .05

TABLE 12
Coefficients of Congruence
Stimulus Coordinates for Six-Dimensional Solution (INDSCAL)

Dim	1A	2A	3A	4A	5A	6A	1B	2B	3B	4B	5B	6B	1C	2C	3C	4C
1A	1.00															
2A	0.17	1.00														
3A	0.00	0.04	1.00													
4A	0.06	-0.02	0.04	1.00												
5A	-0.00	0.00	0.12	0.05	1.00											
6A	-0.05	0.02	-0.00	0.06	0.08	1.00										
1B	0.73*	0.35	-0.03	0.29	0.49*	0.28	1.00									
2B	0.09	0.47	-0.28	-0.81*	-0.10	-0.04	-0.02	1.00								
3B	-0.16	-0.04	-0.86*	0.24	-0.26	0.26	0.02	0.02	1.00							
4B	0.00	-0.79*	-0.32	-0.20	0.19	-0.11	-0.09	-0.06	0.08	1.00						
5B	0.48	0.24	-0.28	0.14	-0.26	-0.71*	0.14	0.13	0.04	-0.03	1.00					
6B	-0.57*	0.22	-0.06	0.18	0.60*	-0.09	-0.02	-0.03	0.01	-0.06	-0.10	1.00				
1C	-0.34	-0.66*	0.11	0.62*	0.13	0.31	-0.11	-0.85*	0.16	0.35	-0.43	0.12	1.00			
2C	0.41	0.40	0.69*	0.43	0.30	-0.19	0.50*	-0.35	-0.64*	-0.50*	0.22	0.08	-0.05	1.00		
3C	-0.54*	-0.11	0.64*	-0.48	0.02	0.16	-0.52*	0.12	-0.55*	-0.10	-0.63*	0.09	0.05	-0.02	1.00	
4C	0.52*	0.03	0.07	0.04	-0.71*	0.20	0.10	0.04	0.07	0.17	0.17	-0.84*	-0.11	0.03	-0.13	1.00
5C	0.18	0.49	-0.10	0.06	0.41	0.75*	0.10	0.19	0.20	-0.31	-0.42	0.15	-0.07	0.11	-0.09	-0.01
6C	0.54*	-0.49*	0.04	-0.34	0.35	-0.03	0.33	0.04	-0.29	0.63*	-0.02	-0.41	-0.01	-0.02	-0.07	0.02
1D	-0.34	-0.64*	-0.71*	-0.19	-0.18	-0.04	-0.45	0.05	0.63*	0.71*	-0.04	-0.03	0.27	-0.90*	-0.18	-0.13
2D	0.69*	0.31	-0.34	-0.03	-0.26	-0.58*	0.30	0.08	0.30	-0.06	0.89*	-0.33	-0.62*	0.16	-0.68*	0.30
3D	-0.44	-0.22	0.37	-0.50*	-0.31	-0.54*	-0.81*	0.17	-0.48*	0.07	0.04	-0.01	-0.19	-0.12	0.64*	-0.13
4D	-0.02	0.53*	-0.24	-0.78*	0.03	0.16	0.03	0.94*	0.04	-0.18	-0.07	0.07	-0.77*	-0.33	0.21	-0.07
5D	-0.22	0.28	-0.22	0.19	-0.82*	0.17	-0.35	0.05	0.48	-0.45	0.10	-0.23	-0.03	-0.25	-0.07	0.55*
6D	-0.55*	0.34	-0.21	0.29	0.37	-0.25	-0.12	-0.07	0.21	-0.27	0.10	0.88*	0.01	0.06	-0.12	-0.76

*P < .05

TABLE 12 (Cont'd)
 Coefficients of Congruence
 Stimulus Coordinates for Six-Dimensional Solution (INDSCAL)

Dim	5C	6C	1D	2D	3D	4D	5D	6D
1A								
2A								
3A								
4A								
5A								
6A								
1B								
2B								
3B								
4B								
5B								
6B								
1C								
2C								
3C								
4C								
5C	1.00							
6C	-0.05	1.00						
1D	-0.33	0.17	1.00					
2D	-0.25	0.17	-0.07	1.00				
3D	-0.75*	-0.06	0.09	-0.08	1.00			
4D	0.40	-0.03	-0.02	0.11	0.07*	1.00		
5D	-0.02	-0.74*	0.07	0.03	0.01	0.04	1.00	
6D	0.03	-0.58*	-0.01	-0.09	-0.00	0.02	-0.01	1.00

*P < .05

for .623 of the variance (STRESS1=.191), a four-dimensional solution for .679 of the variance (STRESS1=.140), a five-dimensional solution for .694 of the variance (STRESS1=.112), and a six-dimensional solution for .710 (STRESS=.100). These results are presented in tabular format in Table 13 and in graphic format in Figure 4. Stimulus coordinates for the two-dimensional solution appear in Table 14. ALSCAL subset analyses are reported in Tables 15-19 and Figures 5 and 6.

Regarding dimensionality, only the two-dimensional solution indicates an "elbow" in the plots of stress along the number of dimensions. (For ALSCAL, stress rather than R^2 should be used to determine dimensionality, according to Davidson (1983) and Young and Lewyckyj (1979)). A two-dimensional solution seems reasonable since authors such as Shepard (1972) recognize that, except for INDSCAL, dimensionality should rarely exceed two or three dimensions. An additional criterion requires that stress be at a minimum. This would appear to pose a problem for the two-dimensional solution, however, since that dimensionality permits stress (or "badness of fit") to be .249. However parsimonious a solution, this is a disappointing result. The stability of the solution looked somewhat more promising. When coefficients of congruence were computed for four subsets of the data, the two-dimensional solution did appear relatively stable. Relatively high congruence was indicated within dimension, but across the subsets. And relatively low congruence was indicated across dimensions. These data are provided in Tables 20-25.

Regarding Shepards's (1972) visualizability criterion, at first glance, Dimension II looks as if it approximates Stone and Gueutal's first

dimension, which they named complexity. However, closer examination reveals a number of inconsistencies in the ordering of job titles for the present Dimension II. Dimension I in the present data does not approximate either of Stone and Gueutal's remaining dimensions. This is evident from both visual inspection and the coefficients of congruence presented in Table 26. Stone and Gueutal's job title stimulus coordinates are reported in Table 27. The present data suggest that Stone and Gueutal's (1985) three-dimensional representation of job dimensions was not supported.

SUMMARY OF RESULTS

As indicated in the previous section, Hypotheses 1, 2, and 3 were untestable because of the unstable INDSCAL solution. Hypothesis 1 stated that the number of dimensions subjects had available to them would predict their differential accuracy in performance appraisal ratings. Hypothesis 2 stated that the number of dimensions subjects had available to them would better predict rater accuracy than would the more traditional REP questionnaire. Again, no conclusions regarding this hypothesis were possible. Hypothesis 3 stated that MDS dimensionality and REP-CC would be significantly related, but not isomorphic. The outcome of such a comparison must likewise await further study.

Hypothesis 4 stated that the present data were expected to replicate Stone and Gueutal's three-dimensional job characteristics model. Several lines of evidence suggest that this hypothesis was not supported. First, a two-dimensional solution best describes the present data, while a three-dimensional solution was reported by Stone and Gueutal (1985).

TABLE 13

Stress and R^2 for Dimensionality One to Six (ALSCAL)

Dimensionality	Stress	R^2
1	.373	.579
2	.249	.607
3	.191	.623
4	.140	.679
5	.117	.694
6	.100	.710

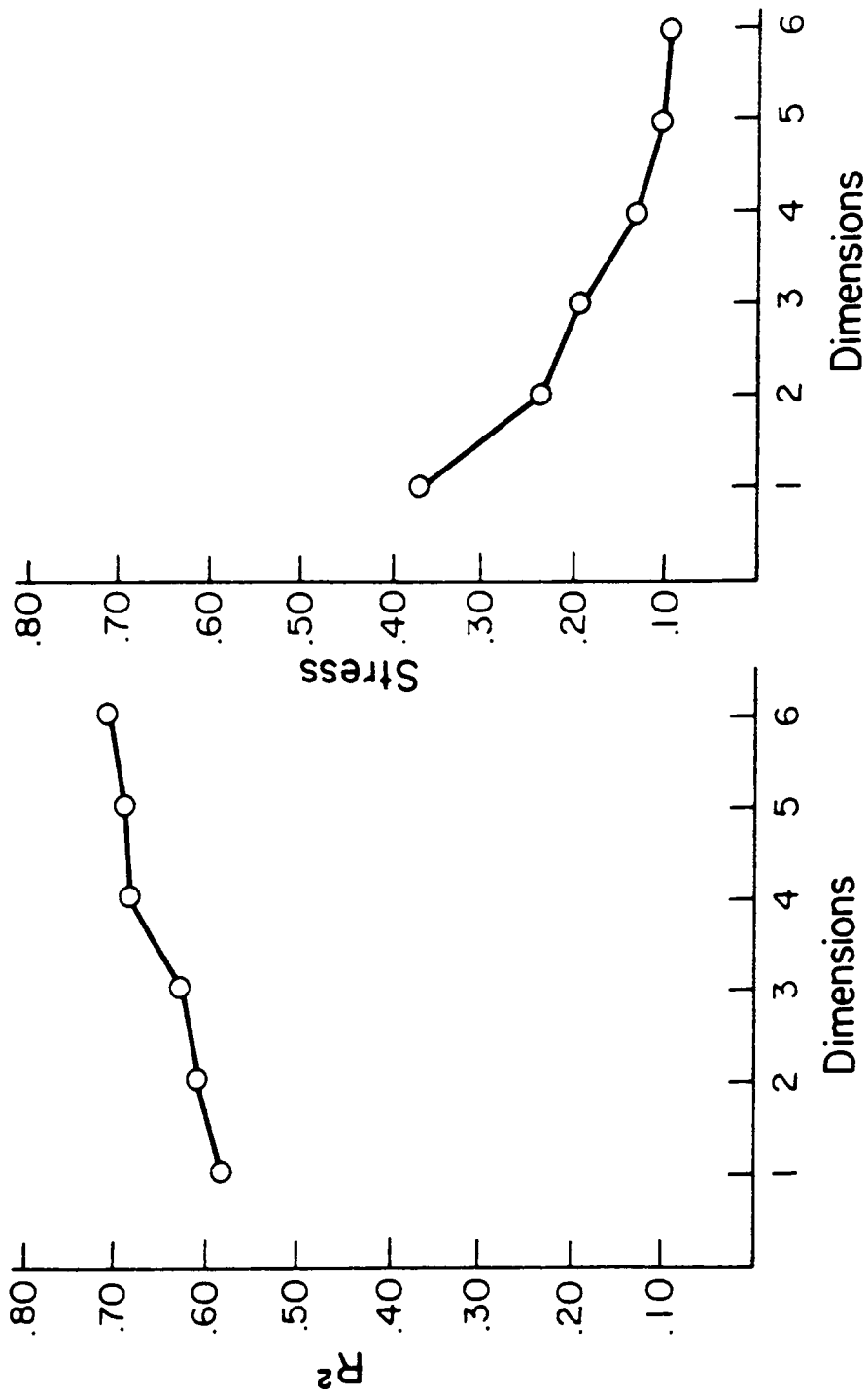


Figure 4: R^2 and Stress as a Function of Dimensionality (ALSCAL)

TABLE 14

Stimulus Coordinates: Two-dimensional Solution

(ALSCAL)

	Dim. 1	Dim. 2
Cashier	0.8545	-1.2078
Retail Mgr.	1.3557	0.4914
Bank Teller	1.1682	-1.0508
Waiter	-0.3517	-1.0063
Cook	-0.9727	-1.3249
Tailor	-0.4444	1.1695
Actor	0.1057	1.8595
File Clerk	1.0957	-0.5783
Lawyer	1.5833	1.1592
Teacher	0.6235	1.3674
Tel.Op.	0.5063	-0.7793
Taxi Driv.	-0.8909	-0.9811
Firefighter	-1.3603	1.0969
Const. Work.	-1.4888	0.6293
Mail Carrier	-0.4379	-1.0334
Machine Op.	-1.0949	-0.3889
Accountant	1.5645	-0.1018
Assembly Frmn.	0.0023	0.9303
Flight Attend.	-0.2618	-0.1781
Janitor	-1.5560	-0.0730

TABLE 15
 Stress and R² for Dimensionality by Subset
 (ALSCAL)

Subset	Dimension	Stress	R ²
A	1	.368	.581
	2	.246	.617
	3	.187	.637
	4	.137	.688
	5	.113	.703
	6	.097	.720
B	1	.399	.522
	2	.267	.552
	3	.205	.572
	4	.150	.629
	5	.124	.647
	6	.107	.659
C	1	.348	.624
	2	.246	.628
	3	.177	.673
	4	.135	.712
	5	.111	.731
	6	.095	.747
D	1	.361	.600
	2	.245	.629
	3	.190	.634
	4	.135	.701
	5	.112	.721
	6	.097	.730

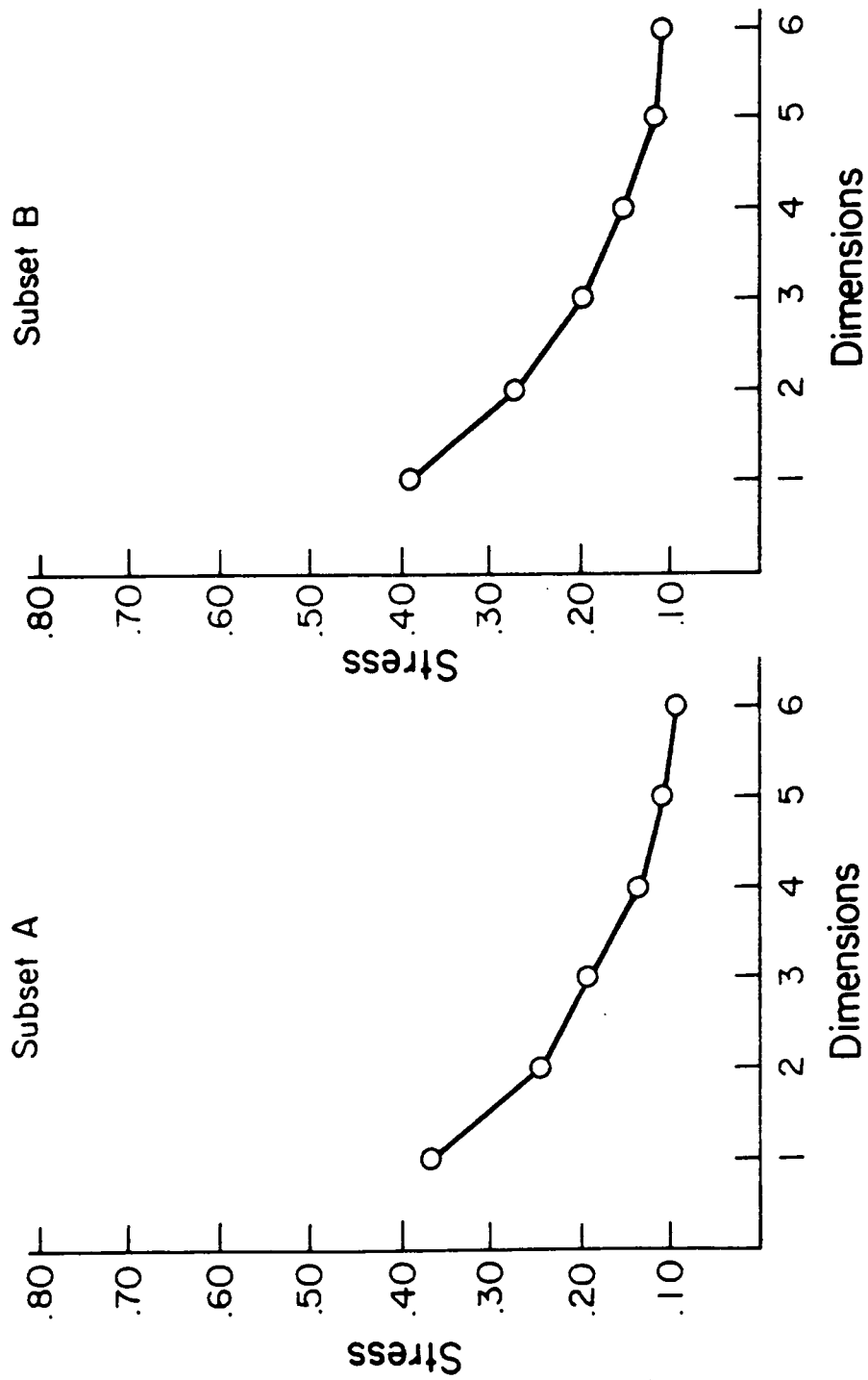


Figure 5: Stress as a Function of Dimensionality (ALSCAL)

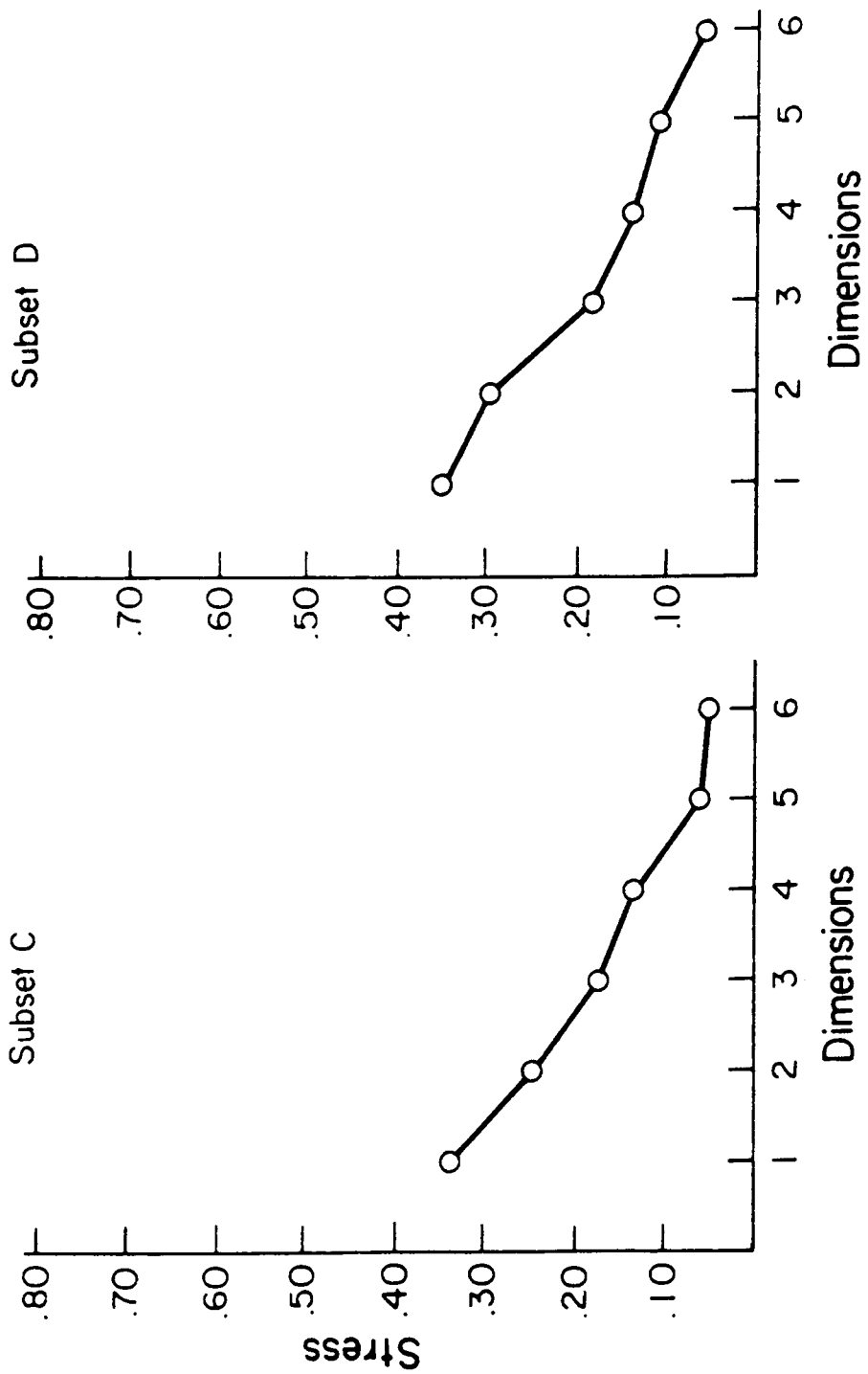


Figure 6: Stress as a Function of Dimensionality (ALSCAL)

TABLE 16

Stimulus Coordinates: Subset A (ALSCAL)

	Dim. 1	Dim. 2
Cashier	0.9478	-1.1827
Retail Mgr.	1.2427	0.6264
Bank Teller	1.3901	-0.8854
Waiter	-0.4524	-1.0814
Cook	-0.8873	-1.3549
Tailor	-0.0242	1.0777
Actor	-0.5416	1.7420
File Clerk	1.2565	-0.3582
Lawyer	1.3482	1.4781
Teacher	0.2745	1.3738
Tel. Operator	0.5358	-0.6782
Taxi Driver	-0.7729	-1.1945
Firefighter	-1.3551	0.9337
Const. Work.	-1.5702	0.6047
Mail Carrier	-0.0986	-1.0386
Machine Op.	-0.9790	-0.3357
Accountant	1.6595	-0.0201
Assembly Frmn.	0.0381	0.8487
Flight Attend.	-0.4154	-0.4628
Janitor	-1.5965	-0.0927

TABLE 17

Stimulus Coordinates: Subset B (ALSCAL)

	Dim. 1	Dim. 2
Cashier	0.9342	-1.1721
Retail Mgr.	1.3436	0.4701
Bank Teller	1.1483	-1.0333
Waiter	-1.1472	-1.1447
Cook	-1.0594	-1.3325
Tailor	-0.6788	1.1148
Actor	-0.6082	1.5944
File Clerk	1.0897	-0.5493
Lawyer	1.4599	1.2352
Teacher	0.5471	1.3682
Tel Op.	0.3603	-0.9376
Taxi Driv.	-0.9418	-0.8911
Firefighter	-1.2718	1.2067
Const. Worker	-1.4831	0.6871
Mail Carrier	-0.5433	-0.9756
Machine Op.	-1.1630	-0.1986
Accountant	1.4844	0.1344
Assembly Frmn.	-0.3212	1.0355
Flight Attend.	0.1419	-0.6418
Janitor	-1.5080	0.0301

TABLE 18

Stimulus Coordinates: Subset C (ALSCAL)

	Dim. 1	Dim. 2
Cashier	0.8192	-1.0569
Retail Mgr.	1.4394	0.6034
Bank Teller	1.1422	-0.9000
Waiter	-0.3472	-1.2096
Cook	-1.0301	-1.2794
Tailor	-0.8885	1.1302
Actor	0.7093	1.5284
File Clerk	0.8788	-0.7673
Lawyer	1.7167	0.7825
Teacher	0.7516	1.1606
Tel. Op.	0.4602	-0.6738
Taxi Driv.	-0.9488	-0.8625
Firefighter	-1.3322	1.1954
Const. Work	-1.3879	0.8963
Mail Carrier	-0.7704	-0.8205
Machine Op.	-0.9323	0.3592
Accountant	1.4556	-0.2119
Assembly Frmn.	0.1096	1.2400
Flight Attend.	-0.2235	-0.8017
Janitor	-1.6216	-0.3125

TABLE 19

Stimulus Coordinates: Subset D (ALSCAL)

	Dim. 1	Dim. 2
Cashier	-0.5216	-1.3718
Retail Mgr.	1.3940	-0.1073
Bank Teller	0.8866	-1.2086
Waiter	-0.2785	0.6995
Cook	-1.2015	-0.9674
Tailor	-0.8179	0.9811
Actor	0.5475	2.0159
File Clerk	0.8876	-0.8693
Lawyer	1.7449	0.9907
Teacher	0.8709	1.3151
Tel. Op.	0.4107	-0.8136
Taxi Driv.	-0.9286	-0.7285
Firefighter	-1.2913	1.2051
Const. Work	-1.5999	0.0144
Mail Carrier	-0.5938	-0.8867
Machine Op.	-0.9602	-0.1111
Accountant	1.5658	-0.3347
Assembly Frmn.	0.3332	0.2477
Flight Attend.	-0.0450	0.7697
Janitor	-1.4459	0.1596

TABLE 20

Coefficients of Congruence

Stimulus Coordinates for One-Dimensional Solution (ALSCAL)

Dim	1A	1B	1C	1D
1A	1.00			
1B	-0.82*	1.00		
1C	0.79*	-0.99*	1.00	
1D	-0.80*	0.99*	-1.00*	1.00

*P < .05

TABLE 21
 Coefficients of Congruence
 Stimulus Coordinates for Two-Dimensional Solution (ALSCAL)

Dim	1A	2A	1B	2B	1C	2C	1D	2D
1A	1.00							
2A	-0.01	1.00						
1B	0.96*	0.09	1.00					
2B	-0.08	0.96*	-0.01	1.00				
1C	0.92*	0.20	0.93*	0.11	1.00			
2C	-0.14	0.91*	-0.09	0.97*	0.04	1.00		
1D	0.87*	0.30	0.88*	0.21	0.95*	0.12	1.00	
2D	-0.29	0.84*	-0.23	0.79*	-0.04	0.73*	0.08	1.00

*P < .05

TABLE 22
 Coefficients of Congruence
 Stimulus Coordinates for Three-Dimensional Solution (AISCAL)

Dim	1A	2A	3A	1B	2B	3B	1C	2C	3C	1D	2D	3D
1A	1.00											
2A	-0.00	1.00										
3A	-0.04	-0.04	1.00									
1B	0.96*	0.08	-0.26	1.00								
2B	-0.08	0.98*	-0.13	0.02	1.00							
3B	0.25	0.06	0.87*	0.02	-0.04	1.00						
1C	0.98*	0.11	-0.14	0.98*	0.05	0.16	1.00					
2C	0.10	-0.55*	0.58*	-0.09	-0.60*	0.55*	-0.04	1.00				
3C	-0.04	0.90*	0.24	-0.03	0.88*	0.28	0.03	-0.20	1.00			
1D	0.78*	-0.00	-0.34	0.84*	-0.02	-0.13	0.80*	0.17	0.03	1.00		
2D	-0.25	0.72*	-0.63*	-0.05	0.78*	-0.63*	-0.11	-0.78*	0.49	0.02	1.00	
3D	-0.03	0.70*	0.58*	-0.12	0.64*	0.65*	-0.01	-0.01	0.83*	-0.23	0.09	1.00

*P < .05

TABLE 23
Coefficients of Congruence
Stimulus Coordinates for Four-Dimensional Solution (ALSCAL)

Dim	1A	2A	3A	4A	1B	2B	3B	4B	1C	2C	3C	4C	1D	2D	3D	4D
1A	1.00															
2A	-0.00	1.00														
3A	-0.03	-0.13	1.00													
4A	-0.01	0.01	-0.01	1.00												
1B	0.96*	0.09	-0.25	-0.08	1.00											
2B	-0.08	0.99*	-0.15	-0.00	0.02	1.00										
3B	0.18	-0.01	0.91*	0.01	-0.04	-0.02	1.00									
4B	-0.05	-0.01	0.02	-0.98*	0.01	0.01	-0.01	1.00								
1C	0.98*	0.11	-0.11	-0.08	0.98*	0.03	0.10	0.01	1.00							
2C	0.11	-0.45	0.88*	0.05	-0.13	-0.47*	0.87*	-0.03*	-0.01	1.00						
3C	-0.06	0.88*	0.31	0.04	-0.08	0.86*	0.37	-0.01	0.01	-0.06	1.00					
4C	0.02	-0.02	-0.05	0.98*	-0.03	-0.04	-0.06	-0.97*	-0.03	0.00	0.00	1.00				
1D	0.95*	0.22	-0.23	-0.06	0.98*	0.15	-0.01	-0.00	0.98*	-0.16	0.06	-0.02	1.00			
2D	-0.24	0.79*	-0.54*	-0.01	-0.06	0.80*	-0.50*	-0.01	-0.11	-0.79*	0.48	-0.01	0.03	1.00		
3D	0.01	0.64*	0.65*	-0.03	-0.11	0.62*	0.70*	0.05	0.02	0.36	0.89*	-0.10	0.00	0.13	1.00	
4D	0.03	0.05	0.01	0.98*	-0.03	0.04	0.02	-0.99*	-0.03	0.04	0.06	0.98*	-0.01	0.03	0.00	1.00

*P < .05

TABLE 24
Coefficients of Congruence
Stimulus Coordinates for Five-Dimensional Solution (ALSAL)

Dim	1A	2A	3A	4A	5A	1B	2B	3B	4B	5B	1C	2C	3C	4C	5C	1D
1A	1.00															
2A	-0.01	1.00														
3A	-0.05	0.01	1.00													
4A	0.05	0.00	0.04	1.00												
5A	0.02	-0.04	0.02	-0.03	1.00											
1B	0.96*	0.08	-0.25	0.14	0.02	1.00										
2B	-0.08	0.98*	0.01	-0.03	-0.02	0.01	1.00									
3B	0.24	-0.03	0.91*	0.02	-0.06	0.01	-0.03	1.00								
4B	0.06	0.02	-0.05	-0.96*	-0.00	-0.02	0.01	0.00	1.00							
5B	0.01	-0.05	0.07	-0.03	0.96*	0.02	-0.02	-0.00	-0.00	1.00						
1C	0.97*	0.12	-0.11	0.14	0.03	0.98*	0.05	0.16	-0.02	0.03	1.00					
2C	0.12	-0.46	0.81*	-0.05	-0.07	-0.13	-0.46	0.88*	0.05	-0.04	-0.02	1.00				
3C	-0.09	0.87*	0.43	-0.01	0.15	-0.11	0.88*	0.37	-0.01	0.16	0.00	-0.05	1.00			
4C	-0.03	-0.02	0.08	0.95*	-0.18	0.02	-0.03	0.08	-0.97*	-0.19	0.03	0.04	-0.01	1.00		
5C	-0.03	0.21	-0.02	-0.16	-0.93*	-0.05	0.17	0.05	0.18	-0.96*	-0.05	0.02	0.02	0.01	1.00	
1D	0.95*	0.22	-0.20	0.15	0.03	0.99*	0.15	0.06	-0.03	0.02	0.99*	-0.15	0.05	0.03	-0.04	1.00
2D	-0.25	0.74*	-0.59*	-0.06	0.01	-0.05	0.75*	-0.68*	0.04	-0.03	-0.11	-0.90*	0.40	-0.09	0.13	0.02
3D	0.05	-0.64*	-0.74*	-0.04	-0.05	0.16	-0.65*	-0.69*	0.05	-0.09	0.01	-0.34	-0.91*	-0.07	-0.06	0.02
4D	-0.06	-0.03	0.01	-0.95*	0.11	0.02	-0.04	-0.05	-0.98*	0.09	0.02	-0.08	-0.01	0.94*	-0.26	0.02
5D	-0.01	0.06	0.01	0.05	-0.86*	-0.05	0.04	0.10	-0.09	-0.93*	-0.05	0.13	-0.05	0.27	0.90*	-0.04

*P < .05

TABLE 24 (Cont'd)
 Coefficients of Congruence
 Stimulus Coordinates for Five-Dimensional Solution (ALSCAL)

Dim	2D	3D	4D	5D
1A				
2A				
3A				
4A				
5A				
1B				
2B				
3B				
4B				
5B				
1C				
2C				
3C				
4C				
5C				
1D				
2D	1.00			
3D	-0.02	1.00		
4D	-0.02	0.00	1.00	
5D	-0.02	-0.03	0.01	1.00

*P < .05

TABLE 25
Coefficients of Congruence
Stimulus Coordinates for Six-Dimensional Solution (ALSCAL)

Dim	1A	2A	3A	4A	5A	6A	1B	2B	3B	4B	5B	6B	1C	2C	3C	4C
1A	1.00															
2A	0.07	1.00														
3A	-0.06	0.05	1.00													
4A	-0.02	0.01	0.01	1.00												
5A	-0.03	-0.03	-0.02	0.01	1.00											
6A	0.03	0.02	-0.03	-0.01	0.06	1.00										
1B	0.89*	0.11	0.29	-0.16	-0.06	-0.04	1.00									
2B	-0.04	0.98*	0.05	0.03	-0.12	0.05	0.01	1.00								
3B	-0.38	-0.03	0.93*	0.03	0.02	-0.11	-0.02	0.00	1.00							
4B	-0.21	-0.11	0.02	-0.78*	-0.24	0.15	-0.09	-0.08	0.07	1.00						
5B	-0.02	-0.04	-0.06	0.04	-0.18	-0.93*	0.02	-0.03	0.00	-0.11	1.00					
6B	-0.01	0.11	-0.02	0.07	0.79*	-0.02	-0.02	-0.02	0.01	-0.09	-0.06	1.00				
1C	0.90*	0.09	0.14	-0.19	0.00	-0.04	0.96*	-0.01	-0.16	-0.11	0.01	-0.05	1.00			
2C	-0.06	0.84*	-0.39	-0.14	-0.02	-0.05	-0.15	0.85*	-0.39	-0.01	0.06	0.02	-0.06	1.00		
3C	-0.21	0.42	0.88*	-0.05	-0.03	-0.14	0.15	0.43	0.88*	-0.01	0.03	0.00	0.01	0.01	1.00	
4C	-0.00	-0.10	-0.04	-0.91*	-0.15	0.22	0.09	-0.09	-0.08	0.83*	-0.18	-0.25	0.12	0.06	-0.04	1.00
5C	0.03	0.05	0.20	0.16	-0.84*	0.20	0.07	0.14	0.15	0.13	-0.11	-0.62*	-0.03	-0.08	0.15	-0.02
6C	-0.02	-0.15	0.02	-0.12	-0.39	-0.87*	0.07	-0.13	0.07	0.12	0.22	-0.22	0.04	-0.07	0.05	0.00
1D	0.89*	0.23	0.23	-0.13	0.00	-0.08	0.98*	0.13	-0.07	-0.15	0.07	0.05	0.96*	-0.02	0.15	0.03
2D	-0.04	0.58*	0.62*	0.06	-0.08	-0.13	0.16	0.53*	0.55*	-0.07	-0.01	0.06	0.07	0.24	0.75*	-0.08
3D	-0.02	0.58*	-0.66*	0.10	-0.12	0.12	-0.25	0.60*	-0.64*	-0.05	-0.05	-0.15	-0.15	0.79*	-0.36	-0.09
4D	-0.02	-0.13	0.01	-0.93*	0.06	-0.06	0.11	0.14	-0.01	0.76*	0.05	-0.02	0.13	0.03	0.03	0.91*
5D	-0.08	0.00	0.07	0.16	-0.64*	-0.75*	0.01	0.06	0.13	-0.02	0.82*	-0.40	-0.04	0.01	0.15	-0.22
6D	0.10	0.02	0.07	-0.11	-0.77	0.50*	0.13	0.10	-0.02	0.32	-0.43	-0.67*	0.08	-0.04	0.02	0.31

*P < .05

TABLE 25 (Cont'd)
Coefficients of Congruence
Stimulus Coordinates for Six-Dimensional Solution (ALSICAL)

Dim	5C	6C	1D	2D	3D	4D	5D	6D
1A								
2A								
3A								
4A								
5A								
6A								
1B								
2B								
3B								
4B								
5B								
6B								
1C								
2C								
3C								
4C								
5C	1.00							
6C	0.08	1.00						
1D	-0.02	0.08	1.00					
2D	0.11	0.00	0.19	1.00				
3D	0.02	-0.12	-0.13	-0.10	1.00			
4D	-0.27	0.18	0.07	-0.04	-0.18	1.00		
5D	0.41	0.89*	0.01	0.10	0.01	-0.15	1.00	
6D	0.85*	-0.21	0.03	0.01	0.07	-0.03	0.07	1.00

*P < .05

TABLE 26

Coefficients of Congruence for Stone and Gueutal's
 Final Solution and Six ALSCAL Solutions

	Stone/ Gueutal 1	Stone/ Gueutal 2	Stone/ Gueutal 3
S/G1	1.00000	0.73636	0.72182
S/G2	0.73636	1.00000	0.77666
S/G3	0.72182	0.77666	1.00000
1ALSCAL1	-0.29827	0.10203	0.37681
2ALSCAL1	0.26280	-0.13711	-0.40776
2ALSCAL2	0.42502	-0.03385	0.21492
3ALSCAL1	0.24890	-0.16622	-0.41590
3ALSCAL2	0.42822	-0.00826	0.21727
3ALSCAL3	-0.05650	-0.33256	0.17075
4ALSCAL1	0.24266	-0.16610	-0.42313
4ALSCAL2	0.41535	-0.04075	0.16563
4ALSCAL3	-0.07128	-0.40897	0.13082
4ALSCAL4	-0.08087	0.01956	0.01027
5ALSCAL1	0.24603	-0.18473	-0.41649
5ALSCAL2	0.43042	-0.00185	0.21182
5ALSCAL3	-0.08136	-0.40317	0.14770
5ALSCAL4	0.07594	-0.01016	-0.01125
5ALSCAL5	-0.02561	0.06281	-0.06490
6ALSCAL1	0.23349	-0.17851	-0.42837
6ALSCAL2	0.44024	-0.02192	0.20244
6ALSCAL3	0.07872	0.40372	-0.14730
6ALSCAL4	0.06092	-0.02050	-0.01655
6ALSCAL5	-0.06775	-0.00370	-0.03597
6ALSCAL6	-0.01630	0.07603	-0.06864

TABLE 27

Stimulus Coordinates: Stone & Gueutal (1985)

	Dim. 1	Dim. 2	Dim. 3
Cashier	17.70	30.27	5.28
Retail Mgr.	78.89	18.94	34.03
Bank Teller	28.25	31.43	1.00
Waiter	21.48	82.09	32.93
Cook	19.93	61.43	44.09
Tailor	53.33	33.42	59.32
Actor	88.77	77.42	46.37
File Clerk	31.10	22.16	16.80
Lawyer	100.00	40.07	29.26
Teacher	83.04	55.15	40.27
Tel.Op.	19.52	43.88	26.07
Taxi Driv.	22.22	70.85	50.21
Firefighter	47.95	44.65	81.09
Const. Work.	30.77	27.09	94.48
Mail Carrier	20.70	54.55	41.50
Machine Op.	16.17	14.38	73.34
Accountant	70.74	9.51	8.41
Assembly Frmn.	60.97	20.59	73.24
Flight Attend.	36.95	85.38	38.36
Janitor	26.94	52.54	79.07

Second, a visual inspection suggests that only on one dimension is there even moderate convergence between any of the present dimensions and the Stone and Gueutal dimensions. Third, coefficients of congruence computed for Stone and Gueutal's job-title stimulus coordinates revealed that there was substantial overlap between Stone and Gueutal's first and second dimensions, first and third dimensions, and second and third dimensions (coefficients of congruence=.736, .722, and .776 respectively, $p < .05$). This calls into question the independence of the Stone and Gueutal's three dimensions.

Although the study's hypotheses were not supported, some additional results are of interest. Interestingly, although REP did not significantly predict differential accuracy in performance ratings ($r = -0.027$, $p > .05$), it did predict differential accuracy in frequency ratings ($r = .148$, $p < .01$). Furthermore, REP also significantly predicted elevation in performance ratings ($r = .143$, $p < .01$). Descriptive statistics appear in Table 28 and correlation tables are presented in Table 29.

Other results indicated that differential accuracy in performance ratings (DAP) was significantly correlated with differential accuracy in frequency ratings (DAF) ($r = .20$, $p < .05$). This overlap is not surprising since the two rating processes were not expected to be totally independent (Murphy et al., 1982). One unexpected result was that there were a number of small but statistically significant intercorrelations among some of the different accuracy components. For example, differential accuracy in performance (DAP) ratings was significantly correlated with elevation in performance (EP) ratings, and with stereotypic accuracy in performance (SAP) ratings. Correlation coefficients are .18 and .17 respectively

($p < .01$). Differential accuracy in frequency (DAF) ratings was significantly related to elevation in frequency (EF) ratings and differential elevation in frequency (DEF) ratings. Correlations are $-.31$ and $.21$ respectively ($p < .01$). These results are despite the fact that these components are presumed to be additive and orthogonal (Cronbach, 1955). DACOR, DECOR, and SACOR were calculated for frequency ratings. Again, no significant relationships between these subcomponents and REP were revealed.

The demographic variables were unrelated to either differential accuracy in performance ratings or differential accuracy in frequency ratings. However, some small but significant correlations were noted between the demographic variables and other components of accuracy. In particular, it should be noted that the number of years a person had worked significantly predicted differential elevation in performance ratings ($r = .13$, $p < .05$). To examine this relationship further, a subset analysis was performed on the years-worked data. The data were trichotomized and submitted to a univariate analysis of variance (ANOVA) procedure. The analysis indicated a significant effect for level of experience, $F(2, 283) = 3.23$, $p < .05$). Means for these groups were $.52$, $.57$ and $.59$ respectively. Results from this procedure appear in Table 30. Tukey's studentized range test revealed that there were significant differences in differential elevation when low and high experience groups were compared ($p < .05$).

Additionally, whether or not a person had been a manager was slightly but significantly related to both elevation and differential elevation in performance ratings ($r = .13$ and $r = .12$, respectively, $p < .05$).

Although raters' gender had no significant bearing upon differential accuracy in the present study, it was correlated with differential elevation in frequency (DEF) ratings ($r=.13$, $p < .05$). It deserves noting that although there are some statistically significant correlates among the demographic variables, in every case the correlations are small and are likely a function of high statistical power (large sample size). Thus, the practical importance of these demographic correlates is unclear. A discussion of the implications of these findings will follow.

Table 28

Descriptive Statistics:

Dimensions, REP, Accuracy Components

Variable	n	Mean	SD	Min.	Max.	Range
REP	305	221.413	56.730	129.000	478.000	349.000
Yrs Worked	286	2.164	1.948	0.000	14.000	14.000
Age	290	18.893	1.406	17.000	31.000	14.000
Diff. Accur. (Perf.)	305	0.487	0.101	0.245	0.809	0.564
Elevation (Perf.)	305	0.492	0.306	0.006	1.556	1.550
Diff. Elevation (Perf.)	305	0.556	0.197	0.094	1.357	1.263
Stereotypic Accur. (Perf.)	305	0.308	0.114	0.086	0.972	0.886
Diff. Accur. Corr. (DAr)	305	0.160	0.233	-0.505	0.820	1.330
Diff. Elevation Corr. (DEr)	305	0.810	0.136	0.165	0.999	0.834
Stereotypic Accur. Corr. (SAr)	305	0.489	0.295	-0.619	0.929	1.547
Total Accuracy (Perf)	305	1.040	0.517	0.244	3.606	3.362

Table 28 (Cont'd)

Descriptive Statistics:

Dimensions, REP, Accuracy Components

Variable	n	Mean	SD	Min.	Max.	Range
Diff. Accur. (Freq.)	305	1.817	0.195	1.278	2.476	1.198
Elevation (Freq.)	305	0.498	0.323	0.004	1.588	1.584
Diff. Elevation (Freq.)	305	1.144	0.297	0.356	1.915	1.559
Stereotypic Accur. (Freq.)	305	1.233	0.236	0.714	1.939	1.225
Diff. Accur. Corr. (DAR Freq.)	305	-0.198	0.135	-0.564	0.199	0.759
Diff. Elevation Corr. (DER Freq.)	305	-0.702	0.264	-0.998	0.949	-1.937
Stereotypic Accur. Corr. (SAR Freq.)	305	-0.125	0.281	-0.736	0.571	1.311
Total Accuracy (Freq)	305	6.660	1.051	3.958	9.621	5.663

Table 29

Correlations for Hypothesized Relationships:
Performance Ratings

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
REP	(1)	1.000							
Differential Accuracy	(2)	-0.027	1.000						
Elevation	(3)	0.143*	0.181**	1.000					
Differential Elevation	(4)	0.055	-0.007	0.219**	1.000				
Stereotypic Accuracy	(5)	-0.044	0.170**	-0.087	-0.195**	1.000			
DAR	(6)	0.016	-0.429**	-0.270**	-0.071	0.105	1.000		
DER	(7)	0.026	-0.063	-0.071	-0.748**	0.128	0.055	1.000	
SAR	(8)	-0.008	0.101	0.054	0.026	-0.269**	-0.024	-0.061	1.000

* p < .05

** p < .01

TABLE 30

Analysis of Variance (ANOVA) for the Effect of
Work Experience on Differential Elevation

Source	df	Sum of Squares	Mean Square	F
Experience	2	0.2490	0.1245	3.25*
Error	283	10.9150	0.0386	
Total	285	11.1641		

* $p < .05$

DISCUSSION

The present study was expected to (a) reoperationalize cognitive complexity, (b) compare the predictiveness of CC-dimensionality with that of CC-REP, (c) assess the relationship between CC-dimensionality and CC-REP, and (d) replicate the three-dimensional job characteristics model of Stone and Gueutal (1985). The attempt to reoperationalize CC was consistent with a number of recommendations (Bieri, 1966; Scott, Osgood, & Peterson, 1979) that MDS is a potentially useful approach to examining the manner in which subjects dimensionalize stimuli. However, the initial (INDSCAL) results reveal that this may not be the case.

To extract dimensionality, the study submitted subjects' similarity ratings of job titles to multidimensional scaling. The individual-differences scaling results revealed that a four-dimensional solution appeared to best account for the rated similarity of job titles. This was determined by the conventional "scree test." In other words, four perceptual dimensions seemed to underlie subjects' perceptions of jobs. As indicated in the results section, the proportion of variance in similarity ratings, which was accounted for by such a four-dimensional solution, approaches levels considered moderately good (but not excellent) by authors Young and Lewyckyj (1979), authors of the software application of the INDSCAL algorithm. However, to determine the adequacy of the solution, stability was also a requirement.

The stability of the Job Similarity Measure was first assessed by computing the average correlations of repeated items for each subject,

converting these correlations (using Fisher's r to Z transformation), and then arriving at an overall or average Z . The results of this assessment suggested reasonably high reliability. In light of the moderately high stability (suggested by the consistency of subjects' ratings of repeated items), it seems unlikely that the instability of dimensionality is the result of subjects' rating inconsistencies.

However, one particularly problematic aspect of these results was the relatively low stability of the group multidimensional scaling solution when a second method was used to determine stability. One method to assess solution (dimensional) stability is the comparison of Job Title Stimulus Coordinates (JTSCs) across four subsets of the data. However, coefficients of congruence for the four random subsets' JTSCs on each dimension suggest that dimensionality was unstable. This instability calls into question the usefulness of the group INDSCAL solution in the present study.

As indicated earlier, one alternative for enhancing stability is to examine coefficients of congruence for alternate dimensional solutions. However, the results revealed that changing the number of dimensions did not result in stable dimensionality.

One usual explanation for solution instability is the use of a higher convergence option (e.g. converge = .01 to .05). As indicated in the results section, the MDS (INDSCAL) algorithm iterates until convergence meets the researcher-specified option (or the default value, .001). This means that S-STRESS (overall "badness of fit") must decrease at least to convergence for the program to continue iterating. The present study employed a convergence option of .001. Although greater

stability can be expected at this level, such stability did not result in the present case. Similarly, the number of iterations that were requested in the program options (iter=10) could not have accounted for the lack of stability because in no case were more than nine iterations required for convergence at .001. So, although increasing the permissible iterations may often result in a better solution, this strategy would not have been helpful in the present case.

A related issue is the inferential testing of particular n-dimensional MDS solutions. Although Weinberg, Carroll, and Cohen (1984) have investigated methods to establish confidence regions for jackknifing and bootstrapping techniques in multidimensional scaling, this work is in its infancy. Thus, the statistically inelegant strategy of determining dimensionality by locating an "elbow" in the plots of R^2 against the number of dimensions will have to suffice.

The disappointing individual-differences scaling results led to an inability to test Hypotheses 1 and 2. Thus, no test for the relationship between individual dimensionality and rater accuracy was possible. Consequently, no comparison could be made between the predictiveness of individual dimensionality and the predictiveness of REP.

However, regarding Hypothesis 3, REP did predict elevation in performance ratings. The less the REP-complexity, the greater the elevation in ratings. Elevation, according to Cronbach (1955), reflects the rater's "way of using a response scale" (p.178). In other words, elevation, the average rating over all ratees and items upon which the ratee is judged, indicates the overall level of the ratings. This means that the higher the REP score (i.e., the greater the tendency to use

dimensions in the same way on the REP), the greater the elevation (in)accuracy. In other words, raters who tend assign the same REP numbers regardless of the dimension also tend to produce ratings which are generally discrepant from true scores. However, it should be noted that statistical power may account for this result and that the practical importance of this finding is unclear.

REP also significantly predicted differential accuracy in frequency ratings. This result contradicts a number of previous studies which revealed no significant relationship between REP and differential accuracy (Bernardin & Cardy, 1981; Bernardin, Cardy, & Carlyle, 1982; Lahey & Saal, 1981; Sauser & Pond, 1981; Sechrest & Jackson, 1961). Though of interest because of its contrast with the above-mentioned studies, this finding may be less than compelling. The correlation coefficient, though significant, was small and of doubtful practical importance. Again, this result may be explained by the statistical power resulting from a large sample size.

Another possible explanation for the small, but significant, correlations between REP and some of the accuracy measures may be common method variance. There may be some construct similarity between the measures. Perhaps both predictor and criterion measure halo.

The present study revealed that the work experience of raters contributed to their differential elevation in performance scores. Specifically, the greater the experience the greater the departure from true scores were the average ratings for each ratee across dimensions. Although not breaking new ground, this is an intriguing finding because, it provides further evidence that performance appraisals for subordinates

may be influenced by the number of years a person has worked. It is possible that experienced workers may be more aware than less experienced workers of the potential impact of performance appraisal on their subordinates and therefore be less willing to shoulder the risks of alienating certain subordinates. The result may be less accurate appraisals.

In a literature review, Landy and Farr (1980) have documented the mixed effects of experience on rating quality. Although some studies (Jurgensen, 1950) reveal that one's job experience affects the quality of ratings, others report that job experience may lead to more lenient ratings (Cascio & Valenzi, 1977; Mandell, 1956) or to no effects on ratings (Klores, 1966). The present study does not resolve the confusion over this issue. Future research may determine the nature of the relationship between job experience and rating quality.

Another hypothesis concerned the predicted relationship between individual differences in dimensionality and REP. Again, this hypothesis was untestable.

The disappointing individual-differences scaling results also prompted a re-analysis of the present data, using ALSCAL's Euclidian model option. When the data were re-analyzed, a two-dimensional solution seemed to best describe the data. This is not unusual, because as indicated earlier, two to three dimensions are usually sufficient to describe the data, except in individual-differences models when sometimes more than three dimensions are necessary (Shepard, 1972). The coefficients of congruence for the ALSCAL scaling solutions revealed that the Stone and Gueutal (1985) dimensions were not retrieved.

This latter result provides probably the most interesting yet unexpected finding of the present study. Although one objective of the present research was the replication of Stone and Gueutal's three-dimensional job characteristics model, the present study revealed that their research may not be as generalizable as once thought (Stone, 1986; Stone and Gueutal, 1985; Stone and Ruddy, 1987). The sample size for the present study should have provided ample opportunity for such a test of the generalizability of their model. Moreover, the present research employed the Stone and Gueutal methodology in the pretest portion of the study. Still, little support for the Stone and Gueutal model emerged.

Possible reasons for the failure to replicate Stone and Gueutal include possible inadequacies of the Job Similarities Questionnaire. Perhaps asking subjects to rate their perceived similarity of job titles is an inadequate means of capturing what truly distinguishes job activities. As Scott (1963) argued, requiring subjects to analyze objects in a phenomenal space may burden their capacities of introspection. Scott goes so far as to question whether subjects can easily "distinguish between such common objects as a rock and a tree" (p. 270). In addition, he cautions that inordinate demands upon the subject may produce artifacts of the method. Perhaps the use of job-analysis techniques may be a more fruitful approach.

Additionally, Stone and Gueutal used correlational evidence to support their claim that the subset analyses converged. The appropriate statistic is the coefficient of congruence (Cattell, 1978; Gorsuch, 1983). However, this statistic may provide vastly different results than

the correlation coefficient. Thus, the initial reporting of the Stone and Gueutal findings may have been premature.

Another possible explanation for the lack of convergence between the Stone and Gueutal dimensions and the present study is potential subject differences. The present study employed introductory psychology students (primarily freshmen), whereas Stone and Gueutal employed undergraduate juniors and seniors. However, any differences between the two samples' familiarity with jobs should not be large. It is therefore doubtful that any such differences could account for the lack of convergence between the dimensions in the two studies.

The failure to replicate the three-dimensional model is of more than academic interest. Job redesign interventions are necessarily based upon the dimensions along which jobs are believed to vary. A failure on the part of scientific research to delineate stable and generalizable job dimensions can lead to misguided efforts in the area of job design. How can the practitioner expect to make sensible changes with respect to "job enrichment," for example, when the foundation for such changes is built on an "earthquake fault"? One of Stone and Gueutal's criticisms of prior job-characteristics research was that such work failed to properly describe the manner in which people actually perceive jobs. Accordingly, these authors have directed much energy away from a priori assumptions about what workers perceive toward an understanding of what workers actually perceive. Yet, despite this considerable effort, these authors may not have achieved the breakthrough that was once hoped.

As indicated earlier, cognitive complexity is conceived not as a trait which is stable across content domains, but rather as a process

variable which may interact with features of the stimulus and is somewhat domain specific. In other words, there are attributes or characteristics of stimuli that combine with the manner in which we process information to affect social judgment. The manner in which we process information is a function of those features, thoughts, etc. which we perceive concerning stimuli.

The domain specificity issue must be further examined empirically. For example, research is required to determine not only whether subjects vary in complexity across broad domains (jobs, roles, etc.), but also whether complexity varies within domains (i.e., for specific jobs). In other words, would one's level of complexity be different for the job of teacher relative to other jobs, such as dentist, pipe-fitter, etc.? Streufert and Streufert (1978) have suggested that such variable complexity may be a complicating factor.

Future research on cognitive complexity must address the construct validity issues outlined earlier. Any future examination of CC must first deal with the issue of an adequate operational definition. Efforts must focus not only on the number of dimensions or pieces of information people use to make social judgments but also on the combinatorial strategies people use to integrate such social information. Results gleaned from the social cognition literature may provide some useful guidance in this regard.

Schema theory has explained social cognition in terms of peoples' use of a schema or mental representation of a person, role, object, etc. (Taylor & Crocker, 1981). For example, people have some mental representation for the role of teacher, leader, employee, etc. People also have implicit personality theories or mental representations of how

the attributes of people are correlated. Regarding leaders, Rush, Thomas, and Lord (1977) found that one's implicit leadership theories may be reflected in one's ratings of leadership behavior. More recently, Lord, Foti, and Philips (1982) have suggested that ratings of leader behavior are the result of a complex information-processing sequence. Individuals enter the workplace with well-developed prototypes of an effective leader and an ineffective leader. Raters compare the leader's behavior to the characteristics of the prototype and then classify the leader as either effective or ineffective. Such a categorization process may thus drive the rater's overall perception of the leader (Foti, Frazer, & Lord, 1982). Redirecting CC research by examining more fully both the content and process of cognitive schemata may provide additional insight concerning how individuals perceive the attributes of others.

Future research is required also to provide a qualitative interpretation of the dimensionality data. The present study attempted but failed to capture the three-dimensional job characteristics model of Stone and Gueutal (1985). Therefore, efforts were not directed at exploring potential names for dimensions. So, the number but not enough of the nature of the dimensions was at issue. Additional research is needed to examine the nature of the dimensions underlying jobs.

Additional research might also be aimed at determining whether there is a quantitative representation of cognitive complexity. Should other exploratory efforts demonstrate correlational evidence of a dimensionality-to-rating link, controlled laboratory experiments would likewise be a necessary follow-up.

Finally, a major focus of future research should be the development of more reliable measures. Because reliability sets the limits for validity, the importance of this prescription cannot be overstated.

In sum, the present study attempted, but failed, to provide a new operational definition of cognitive dimensionality. Similarly, a comparison of cognitive dimensionality with the traditional REP-test could not be made. Moreover, an expected replication of Stone and Gueutal's (1985) model of job characteristics was not revealed. The results, while not supportive of the research hypotheses, nevertheless provide some answers to persistent questions about the operationalizing of cognitive complexity and the dimensions underlying jobs. Meanwhile, it would appear that, as Bernardin, Cardy, and Carlyle (1982) have noted for cognitive complexity and appraisal effectiveness, it's "back to the drawing board" (p. 151). It also may be "back to the drawing board" for the job-characteristics approach to designing jobs.

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APPENDIX A

FAMILIARITY QUESTIONNAIRE

Directions: Please rate your familiarity with the work activities of persons holding the jobs listed below. Please use the following scale for your ratings.

1:	2:	3:	4:	5:
NOT AT ALL FAMILIAR	SLIGHTLY FAMILIAR	MODERATELY FAMILIAR	VERY FAMILIAR	TOTALLY FAMILIAR

1. CASHIER
2. JANITOR
3. FIRE FIGHTER
4. TELEPHONE OPERATOR
5. BANK TELLER
6. MAIL CARRIER
7. TAXI DRIVER
8. FILE CLERK
9. ACCOUNTANT
10. SHORT-ORDER COOK
11. ACTOR
12. ASSEMBLY-LINE FOREMAN
13. MACHINE OPERATOR
14. ELEMENTARY SCHOOL TEACHER
15. FLIGHT ATTENDANT
16. WAITER/WAITRESS
17. CONSTRUCTION WORKER
18. TAILOR
19. LAWYER
20. RETAIL STORE MANAGER

Appendix A (Continued)

Descriptive Statistics:

Familiarity Ratings

Job	n	Mean	S.D.	Minimum	Maximum	Range
Cashier	39	4.231	0.872	2.000	5.000	3.000
Janitor	39	3.949	1.169	2.000	5.000	3.000
Firefighter	39	3.821	1.144	2.000	5.000	3.000
Telephone Op.	39	3.410	1.208	2.000	5.000	3.000
Bank Teller	39	3.641	1.246	1.000	5.000	4.000
Mail Carrier	39	3.744	1.141	1.000	5.000	4.000
Taxi Driver	39	3.667	1.243	1.000	5.000	4.000
File Clerk	39	3.333	1.475	1.000	5.000	4.000
Accountant	39	3.282	1.395	1.000	5.000	4.000
Short-Order Cook	39	4.051	1.050	1.000	5.000	4.000
Actor	39	3.795	1.151	1.000	5.000	4.000
Assembly Line Foreman	39	2.974	1.442	1.000	5.000	4.000
Machine Operator	39	3.308	1.454	1.000	5.000	4.000
Teacher	39	4.051	1.025	2.000	5.000	3.000
Flight Attendant	39	3.385	1.290	1.000	5.000	4.000
Waiter/Waitress	39	4.410	0.677	3.000	5.000	3.000
Construct. Work.	39	3.667	1.402	1.000	5.000	4.000
Tailor	39	3.282	1.376	1.000	5.000	4.000
Lawyer	39	3.590	1.371	1.000	5.000	4.000
Retail Manager	39	3.615	1.310	1.000	5.000	4.000

APPENDIX B

BIOGRAPHICAL QUESTIONNAIRE

Subject Number: _____

Job Similarities Study

Interview, Interviewer, and Interviewee Information

***** Interview Information *****

1. Date: Month: _____ Day: _____ Year: _____

2. Time: Starting _____ Ending: _____ AM PM

***** Interview Information *****

3. Name: Last: _____ First: _____ MI: _____

***** Interview Information *****

4. Name: Last: _____ First: _____ MI: _____

5. Street name and number: _____

City: _____ State: _____ Zip _____

6. Telephones: Home: _____ Work: _____

7. Occupational/job title: _____

8. Job duties: _____

9. Nature of present job: [] non-managerial [] managerial

10. Employing organization's function (e.g., manufacturing, sales, education, government agency):

11. Tenure on current job: Years: _____ Months: _____

12. Combined tenure on all jobs, past and present: Years: _____ Months: _____

13. Years of formal education: _____

14. Diplomas and/or degrees (check highest level of attainment):

High school diploma or GED equivalent

Associates degree

Bachelors degree

Masters degree

Doctoral degree

15. Sex: Male

Female

16. Age in years: _____

APPENDIX C

JOB SIMILARITY QUESTIONNAIRE

General Instructions for Similarity Ratings

1. Please enter the last four digits of your social security number in the boxes in the upper left corner of both attached opscan forms.
2. Be SURE that you begin with the opscan marked "Form No. 1" in red ink at the bottom of the page. On Form No. 1, please mark your responses to similarity ratings 1-100 in the spaces designated 1-100.
3. When you reach line 101, you will notice that the "1" circle is coded. Do not erase this code. It tells the computer that you have marked Form 1. (It is also a reminder for you to stop working on this op-scan form and turn to the next op-scan form.)
4. Then, on Form No. 2 (so marked in Blue Ink at the Bottom of the page), please mark your responses to items 101-200 in the spaces designated 1-100. Please be sure that you are coding your op-scans correctly.
5. Again, you will notice that on line 101 of your op-scan sheet there is a circle darkened. This time the "2" circle will be darkened. This will indicate to the computer that you have marked Form No. 2.
6. Please turn to the questionnaire, read the instructions at the top of each page, and complete the questionnaire by darkening the appropriate circle on your op-scan sheets.
7. PLEASE MAKE NO MARKS ON THE SIMILARITY QUESTIONNAIRE ITSELF.
8. When you have completed your similarity ratings, please proceed to the remaining portions of the questionnaire packet.

THANK YOU FOR YOUR ASSISTANCE.

Use the following numeric values to indicate how similar the job duties are for the pairs of jobs shown below:

1:	2:	3:	4:	5:	6:
NOT AT ALL SIMILAR	SLIGHTLY SIMILAR	SOMEWHAT SIMILAR	MODERATELY SIMILAR	VERY MUCH SIMILAR	ALMOST COMPLETELY SIMILAR

1. CASHIER and
RETAIL STORE MANAGER
2. BANK TELLER and
WAITER/WAITRESS
3. SHORT-ORDER COOK and
TAILOR
4. ACTOR and
BANK TELLER
5. FILE CLERK and
LAWYER
6. ELEMENTARY SCHOOL TEACHER and
TELEPHONE OPERATOR
7. MACHINE OPERATOR and
TAXI DRIVER
8. FIRE FIGHTER and
TELEPHONE OPERATOR
9. CONSTRUCTION LABORER and
MAIL CARRIER
10. LAWYER and
WAITER/WAITRESS
11. BANK TELLER and
FIRE FIGHTER
12. MACHINE OPERATOR and
TAILOR
13. ACCOUNTANT and
ASSEMBLY-LINE FOREMAN
14. FILE CLERK and
TAXI DRIVER

Use the following numeric values to indicate how similar the job duties are for the pairs of jobs shown below:

1:	2:	3:	4:	5:	6:
NOT AT ALL SIMILAR	SLIGHTLY SIMILAR	SOMEWHAT SIMILAR	MODERATELY SIMILAR	VERY MUCH SIMILAR	ALMOST COMPLETELY SIMILAR

15. ELEMENTARY SCHOOL TEACHER and
SHORT-ORDER COOK

16. MACHINE OPERATOR and
FILE CLERK

17. ACCOUNTANT and
TELEPHONE OPERATOR

18. CONSTRUCTION LABORER and
LAWYER

19. FILE CLERK and
JANITOR

20. ACCOUNTANT and
FIRE FIGHTER

21. LAWYER and
RETAIL STORE MANAGER

22. JANITOR and
SHORT-ORDER COOK

23. CASHIER and
TAILOR

24. FIRE FIGHTER and
MAIL CARRIER

25. CASHIER and
JANITOR

26. ACTOR and
ELEMENTARY SCHOOL TEACHER

27. ACCOUNTANT and
SHORT-ORDER COOK

28. CONSTRUCTION LABORER and
ELEMENTARY SCHOOL TEACHER

Use the following numeric values to indicate how similar the job duties are for the pairs of jobs shown below:

1:	2:	3:	4:	5:	6:
NOT AT ALL SIMILAR	SLIGHTLY SIMILAR	SOMEWHAT SIMILAR	MODERATELY SIMILAR	VERY MUCH SIMILAR	ALMOST COMPLETELY SIMILAR

29. LAWYER and
TAXI DRIVER
30. ASSEMBLY-LINE FOREMAN and
RETAIL STORE MANAGER
31. ACCOUNTANT and
FLIGHT ATTENDANT
32. CASHIER and
TAXI DRIVER
33. BANK TELLER and
TAXI DRIVER
34. FILE CLERK and
FLIGHT ATTENDANT
35. CASHIER and
LAWYER
36. FILE CLERK and
TAILOR
37. JANITOR and
MAIL CLERK
38. ELEMENTARY SCHOOL TEACHER and
TAXI DRIVER
39. BANK TELLER and
TELEPHONE OPERATOR
40. ACCOUNTANT and
ELEMENTARY SCHOOL TEACHER
41. ASSEMBLY-LINE FOREMAN and
JANITOR
42. ACTOR and
TAXI DRIVER

Use the following numeric values to indicate how similar the job duties are for the pairs of jobs shown below:

1:	2:	3:	4:	5:	6:
NOT AT ALL SIMILAR	SLIGHTLY SIMILAR	SOMEWHAT SIMILAR	MODERATELY SIMILAR	VERY MUCH SIMILAR	ALMOST COMPLETELY SIMILAR

- 43. ACCOUNTANT and
MAIL CARRIER
- 44. SHORT ORDER COOK and
TAXI DRIVER
- 45. LAWYER and
MACHINE OPERATOR
- 46. TAILOR and
WAITER/WAITRESS
- 47. ELEMENTARY SCHOOL TEACHER and
FIRE FIGHER
- 48. JANITOR and
LAWYER
- 49. ACTOR and
FIRE FIGHTER
- 50. ACCOUNTANT and
LAWYER
- 51. FLIGHT ATTENDANT and
WAITER/WAITRESS
- 52. ACCOUNTANT and
CONSTRUCTION LABORER
- 53. ASSEMBLY-LINE FOREMAN and
ELEMENTARY SCHOOL TEACHER
- 54. MACHINE OPERATOR and
RETAIL STORE MANAGER
- 55. FLIGHT ATTENDANT and
TAXI DRIVER
- 56. ASSEMBLY-LINE FOREMAN and
MAIL CARRIER

Use the following numeric values to indicate how similar the job duties are for the pairs of jobs shown below:

1:	2:	3:	4:	5:	6:
NOT AT ALL SIMILAR	SLIGHTLY SIMILAR	SOMEWHAT SIMILAR	MODERATELY SIMILAR	VERY MUCH SIMILAR	ALMOST COMPLETELY SIMILAR

- 57. CASHIER and
ELEMENTARY SCHOOL TEACHER
- 58. ACTOR and
FLIGHT ATTENDANT
- 59. LAWYER and
SHORT-ORDER COOK
- 60. FILE CLERK and
TELEPHONE OPERATOR
- 61. ACTOR and
SHORT-ORDER COOK
- 62. ASSEMBLY-LINE FOREMAN and
TAILOR
- 63. ACTOR and
CASHIER
- 64. LAWYER and
TELEPHONE OPERATOR
- 65. ELEMENTARY SCHOOL TEACHER and
RETAIL STORE MANAGER
- 66. CASHIER and
FLIGHT ATTENDANT
- 67. ACTOR and
MACHINE OPERATOR
- 68. FLIGHT ATTENDANT and
MAIL CARRIER
- 69. TAILOR and
TELEPHONE OPERATOR
- 70. BANK TELLER and
CONSTRUCTION LABORER

Use the following numeric values to indicate how similar the job duties are for the pairs of jobs shown below:

	1:	2:	3:	4:	5:	6:
	NOT AT ALL SIMILAR	SLIGHTLY SIMILAR	SOMEWHAT SIMILAR	MODERATELY SIMILAR	VERY MUCH SIMILAR	ALMOST COMPLETELY SIMILAR
71.	FIRE FIGHTER and FLIGHT ATTENDANT					
72.	BANK TELLER and TAILOR					
73.	MACHINE OPERATOR and MAIL CARRIER					
74.	CONSTRUCTION LABORER and RETAIL STORE MANAGER					
75.	BANK TELLER and MACHINE OPERATOR					
76.	ACCOUNTANT and CASHIER					
77.	ELEMENTARY SCHOOL TEACHER and FLIGHT ATTENDANT					
78.	CONSTRUCTION LABORER and TAILOR					
79.	ACTOR and LAWYER					
80.	ACCOUNTANT and WAITER/WAITRESS					
81.	CASHIER and FILE CLERK					
82.	FLIGHT ATTENDANT and LAWYER					
83.	ACCOUNTANT and TAXI DRIVER					
84.	FLIGHT ATTENDANT and RETAIL STORE MANAGER					

Use the following numeric values to indicate how similar the job duties are for the pairs of jobs shown below:

1:	2:	3:	4:	5:	6:
NOT AT ALL SIMILAR	SLIGHTLY SIMILAR	SOMEWHAT SIMILAR	MODERATELY SIMILAR	VERY MUCH SIMILAR	ALMOST COMPLETELY SIMILAR

- 85. BANK TELLER and
LAWYER
- 86. ACTOR and
TELEPHONE OPERATOR
- 87. ACCOUNTANT and
TAILOR
- 88. ELEMENTARY SCHOOL TEACHER and
WAITER/WAITRESS
- 89. TAXI DRIVER and
TELEPHONE OPERATOR
- 90. ACTOR and
MAIL CARRIER
- 91. ASSEMBLY-LINE FOREMAN and
LAWYER
- 92. FIRE FIGHTER and
WAITER/WAITRESS
- 93. ACTOR and
CONSTRUCTION LABORER
- 94. ASSEMBLY-LINE FOREMAN and
MACHINE OPERATOR
- 95. CASHIER and
SHORT-ORDER COOK
- 96. FLIGHT ATTENDANT and
JANITOR
- 97. ACCOUNTANT and
RETAIL STORE MANAGER
- 98. BANK TELLER and
JANITOR

Use the following numeric values to indicate how similar the job duties are for the pairs of jobs shown below:

1:	2:	3:	4:	5:	6:
NOT AT ALL SIMILAR	SLIGHTLY SIMILAR	SOMEWHAT SIMILAR	MODERATELY SIMILAR	VERY MUCH SIMILAR	ALMOST COMPLETELY SIMILAR

- 99. MAIL CARRIER and
WAITER/WAITRESS
- 100. CONSTRUCTION LABORER and
FLIGHT ATTENDANT
- 101. JANITOR and
TAXI DRIVER
- 102. ACTOR and
ASSEMBLY-LINE FOREMAN
- 103. FILE CLERK and
SHORT-ORDER COOK
- 104. RETAIL STORE MANAGER and
TAXI DRIVER
- 105. CONSTRUCTION LABORER and
FIRE FIGHTER
- 106. ASSEMBLY-LINE FOREMAN and
TELEPHONE OPERATOR
- 107. FIRE FIGHTER and
TAXI DRIVER
- 108. ACTOR and
TAILOR
- 109. CONSTRUCTION LABORER and
WAITER/WAITRESS
- 110. MAIL CARRIER and
TAXI DRIVER
- 111. MACHINE OPERATOR and
TELEPHONE OPERATOR
- 112. CONSTRUCTION LABORER and
FILE CLERK

Use the following numeric values to indicate how similar the job duties are for the pairs of jobs shown below:

1:	2:	3:	4:	5:	6:
NOT AT ALL SIMILAR	SLIGHTLY SIMILAR	SOMEWHAT SIMILAR	MODERATELY SIMILAR	VERY MUCH SIMILAR	ALMOST COMPLETELY SIMILAR

- 113. ACTOR and
WAITER/WAITRESS
- 114. MAIL CARRIER and
RETAIL STORE MANAGER
- 115. ACCOUNTANT and
MACHINE OPERATOR
- 116. FIRE FIGHTER and
LAWYER
- 117. CONSTRUCTION LABORER and
MACHINE OPERATOR
- 118. ACTOR and
JANITOR
- 119. CASHIER and
MACHINE OPERATOR
- 120. BANK TELLER and
RETAIL STORE MANAGER
- 121. ACCOUNTANT and
BANK TELLER
- 122. JANITOR and
RETAIL STORE MANAGER
- 123. CASHIER and
WAITER/WAITRESS
- 124. CONSTRUCTION LABORER and
TELEPHONE OPERATOR
- 125. MAIL CARRIER and
TAILOR
- 126. BANK TELLER and
SHORT-ORDER COOK

Use the following numeric values to indicate how similar the job duties are for the pairs of jobs shown below:

1:	2:	3:	4:	5:	6:
NOT AT ALL SIMILAR	SLIGHTLY SIMILAR	SOMEWHAT SIMILAR	MODERATELY SIMILAR	VERY MUCH SIMILAR	ALMOST COMPLETELY SIMILAR

- 127. RETAIL STORE MANAGER and
TAILOR
- 128. ELEMENTARY SCHOOL TEACHER and
MACHINE OPERATOR
- 129. FIRE FIGHTER and
SHORT-ORDER COOK
- 130. JANITOR and
MACHINE OPERATOR
- 131. FLIGHT ATTENDANT and
TAILOR
- 132. ACCOUNTANT and
ACTOR
- 133. CONSTRUCTION LABORER and
SHORT-ORDER COOK
- 134. ASSEMBLY-LINE FOREMAN and
BANK TELLER
- 135. ELEMENTARY SCHOOL TEACHER and
FILE CLERK
- 136. ASSEMBLY-LIINE FOREMand and
CASHIER
- 137. RETAIL STORE MANAGER and
SHORT-ORDER COOK
- 138. LAWYER and
MAIL CARRIER
- 139. ASSEMBLY-LINE FOREMAN and
FLIGHT ATTENDANT
- 140. FILE CLERK and
FIRE FIGHTER

Use the following numeric values to indicate how similar the job duties are for the pairs of jobs shown below:

1:	2:	3:	4:	5:	6:
NOT AT ALL SIMILAR	SLIGHTLY SIMILAR	SOMEWHAT SIMILAR	MODERATELY SIMILAR	VERY MUCH SIMILAR	ALMOST COMPLETELY SIMILAR

- 141. CASHIER and
CONSTRUCTION LABORER
- 142. FLIGHT ATTENDANT and
MACHINE OPERATOR
- 143. ASSEMBLY-LINE FOREMAN and
SHORT-ORDER COOK
- 144. FIRE FIGHTER and
TAILOR
- 145. ASSEMBLY-LINE FOREMAN and
TAXI DRIVER
- 146. ACTOR and
FILE CLERK
- 147. MAIL CARRIER and
TELEPHONE OPERATOR
- 148. MACHINE OPERATOR and
WAITER/WAITRESS
- 149. ACTOR and
RETAIL STORE MANAGER
- 150. ELEMENTARY SCHOOL TEACHER and
JANITOR
- 151. ASSEMBLY-LINE FOREMAN and
FIRE FIGHTER
- 152. FLIGHT ATTENDANT and
TELEPHONE OPERATOR
- 153. CASHIER and
FIRE FIGHTER
- 154. BANK TELLER and
MAIL CARRIER

Use the following numeric values to indicate how similar the job duties are for the pairs of jobs shown below:

1:	2:	3:	4:	5:	6:
NOT AT ALL SIMILAR	SLIGHTLY SIMILAR	SOMEWHAT SIMILAR	MODERATELY SIMILAR	VERY MUCH SIMILAR	ALMOST COMPLETELY SIMILAR

155. CONSTRUCTION LABORER and
TAXI DRIVER

156. JANITOR and
TELEPHONE OPERATOR

157. TAXI DRIVER and
WAITER/WAITRESS

158. RETAIL STORE MANAGER and
TELEPHONE OPERATOR

159. BANK TELLER and
CASHIER

160. ELEMENTARY SCHOOL TEACHER and
LAWYER

161. SHORT-ORDER COOK and
TELEPHONE OPERATOR

162. FIRE FIGHTER and
MACHINE OPERATOR

163. FILE CLERK and
WAITER/WAITRESS

164. TAXI DRIVER and
TAILOR

165. FIRE FIGHTER and
JANITOR

166. RETAIL STORE MANAGER and
WAITER/WAITRESS

167. ACCOUNTANT and
JANITOR

168. BANK TELLER and
FILE CLERK

Use the following numeric values to indicate how similar the job duties are for the pairs of jobs shown below:

1:	2:	3:	4:	5:	6:
NOT AT ALL SIMILAR	SLIGHTLY SIMILAR	SOMEWHAT SIMILAR	MODERATELY SIMILAR	VERY MUCH SIMILAR	ALMOST COMPLETELY SIMILAR

- 169. FIRE FIGHTER and
RETAIL STORE MANAGER
- 170. MACHINE OPERATOR and
SHORT-ORDER COOK
- 171. BANK TELLER and
ELEMENTARY SCHOOL TEACHER
- 172. CASHIER and
TELEPHONE OPERATOR
- 173. SHORT-ORDER COOK and
WAITER/WAITRESS
- 174. FILE CLERK and
MAIL CARRIER
- 175. BANK TELLER and
FLIGHT ATTENDANT
- 176. ASSEMBLY-LINE FOREMAN and
CONSTRUCTION LABORER
- 177. JANITOR and
WAITER/WAITRESS
- 178. FLIGHT ATTENDANT and
SHORT-ORDER COOK
- 179. CASHIER and
MAIL CARRIER
- 180. LAWYER and
TAILOR
- 181. ASSEMBLY-LINE FOREMAN and
WAITER/WAITRESS
- 182. MAIL CARRIER and
SHORT-ORDER COOK

Use the following numeric values to indicate how similar the job duties are for the pairs of jobs shown below:

1:	2:	3:	4:	5:	6:
NOT AT ALL SIMILAR	SLIGHTLY SIMILAR	SOMEWHAT SIMILAR	MODERATELY SIMILAR	VERY MUCH SIMILAR	ALMOST COMPLETELY SIMILAR
183.	ACCOUNTANT and FILE CLERK				
184.	ELEMENTARY SCHOOL TEACHER and MAIL CARRIER				
185.	JANITOR and TAILOR				
186.	FILE CLERK and RETAIL STORE MANAGER				
187.	ELEMENTARY SCHOOL TEACHER and TAILOR				
188.	TELEPHONE OPERATOR and WAITER/WAITRESS				
189.	CONSTRUCTION LABORER and JANITOR				
190.	ASSEMBLY-LINE FOREMAN and FILE CLERK				
191.	SHORT-ORDER COOK and ELEMENTARY SCHOOL TEACHER				
192.	RETAIL STORE MANAGER and ASSEMBLY-LINE FOREMAN				
193.	MACHINE OPERATOR and LAWYER				
194.	TELEPHONE OPERATOR and FILE CLERK				
195.	MACHINE OPERATOR and BANK TELLER				
196.	MAIL CARRIER and ACTOR				

Use the following numeric values to indicate how similar the job duties are for the pairs of jobs shown below:

1:	2:	3:	4:	5:	6:
NOT AT ALL SIMILAR	SLIGHTLY SIMILAR	SOMEWHAT SIMILAR	MODERATELY SIMILAR	VERY MUCH SIMILAR	ALMOST COMPLETELY SIMILAR

197. JANITOR and
ELEMENTARY SCHOOL TEACHER

198. RETAIL STORE MANAGER and
BANK TELLER

199. FILE CLERK and
ELEMENTARY SCHOOL TEACHER

200. FIRE FIGHTER and
CONSTRUCTION LABORER

APPENDIX D

REP GRID MEASURE

JOB DESCRIPTOR QUESTIONNAIRE

Directions: Listed below are ten sets of job titles. For each set of three job titles, please think about what makes any two of the jobs similar to one another, but different from the third. First, write a descriptive word that indicates what is similar about the two jobs in the "Descriptive Word" column. Now write down the word you believe to be the opposite of that descriptive word in the "Opposite" column. Continue this process for each group of three jobs until you have written ten (10) words and their opposites. Please don't repeat any words; use a different word for each of the ten sets of job titles. When you are finished, please turn to the instructions for the grid task.

Job Titles	Descriptive Word (a)	Opposite (b)
1. cashier tailor lawyer		
2. fire fighter actor elementary school teacher		
3. taxi driver actor assembly-line foreman		
4. cashier bank teller waiter/waitress		
5. actor machine operator tailor		
6. short-order cook elementary school teacher flight attendant		
7. file clerk assembly-line foreman retail store manager		
8. telephone operator bank teller construction worker		

9. telephone operator
actor
retail store manager

10. fire fighter
bank teller
file clerk

JOB GRID TASK

Instructions:

1. Please turn to the GRID Form on the next page.
2. Carefully copy the ten descriptive words and their opposites from the previous questionnaire onto the grid form. Copy words from column (a) on the Job Descriptor Questionnaire to column (a) on the Grid Form. Copy words from column (b) on the Job Descriptor Questionnaire to column (b) on the Grid Form.
3. Make sure that you position the next page so that the words "Grid Form" appear centered at the bottom of the page (and Code No. appears in the upper right column).
4. Look at the job CASHIER listed in the first column (upper left hand corner of the grid). Using a scale of +3 (very high on the descriptive word) to -3 (very high on its opposite), assign the job of cashier one number for the pair of terms (descriptive word and its opposite) in Row 1. In other words, your rating for the job CASHIER for the pair of words in Row 1 will be ONE of the following: +3, +2, +1, -1, -2, -3. Place your rating in the square on the Grid that corresponds to column one, row one (i.e. the first square in the upper left corner).
5. Next, moving DOWN the first column, rate the job CASHIER for the second word/opposite terms (in Row No. 2) and so on until you have entered ratings for the first job on all ten descriptors/opposites. Be careful to place your ratings in the grid square that corresponds to the appropriate job column and descriptor row.
6. Now rate the job JANITOR in the same manner that you did the first job, and so on until all twenty jobs are rated on all ten descriptor/opposite terms.

CODE NO. _____

	DESCRIPTIVE WORD					OPPOSITE				
	(a)	+3	+2	+1	-1	-2	-3	(b)		
20	RETAIL STORE MANAGER									
19	LAWYER									
18	TAILOR									
17	CONSTRUCTION WORKER									
16	WAITER/WAITRESS									
15	FLIGHT ATTENDANT									
14	ELEMENTARY SCHOOL TEACHER									
13	MACHINE OPERATOR									
12	ASSEMBLY-LINE FOREMAN									
11	ACTOR									
10	SHORT-ORDER COOK									
9	ACCOUNTANT									
8	FILE CLERK									
7	TAXI DRIVER									
6	MAIL CARRIER									
5	BANK TELLER									
4	TELEPHONE OPERATOR									
3	FIRE FIGHTER									
2	JANITOR									
1	CASHIER									

GRID FORM

APPENDIX E

BIOGRAPHICAL QUESTIONNAIRE

I.D. No. _____

PARTICIPANT INFORMATION

1. Have you held a paying job?
2. If you have held a paying job, for how long?
Years: _____ Months: _____
3. What is/was your most recent occupational/job title?
4. What are/were your job duties?
5. Nature of most recent job:
 non-managerial managerial
6. If you have EVER been a manager, for how long have you been one?
Years: _____ Months: _____
7. Employing organization's function (eg. manufacturing, sales, education, government agency):
8. Tenure (length of service) on current job:
Years: _____ Months: _____
9. What is your age in years?
10. What is your year in college? (eg. Freshman, Sophomore, Junior, Senior).
11. Are you a male or a female?

APPENDIX F
PERFORMANCE RATING QUESTIONNAIRE

PERFORMANCE RATING TASK

Instructions:

You are being asked to participate in a teacher evaluation study. In a few minutes you will view videotapes of four instructors. Please watch these carefully because you will be asked to respond to questions concerning the performance of the instructors.

After viewing each instructor's presentation, you will complete a two-page questionnaire. Please use the orange op-scan sheets for your responses. There is a separate sheet for each lecturer.

When you have completed the ratings for the first instructor, please wait quietly for the researcher to begin the next tape. This process will be repeated until all four instructors have been rated.

Your ratings will be used for feedback and research purposes only. They will not affect the lecturer's employment status or salary. Individual responses will be strictly confidential. Only group data will be reported. If you have any questions, please direct them to the researcher. Thank you for your participation. Your assistance will enable us to better understand the performance appraisal process.

Teacher Evaluation Form

Directions: How often did the instructor you just observed on the tape demonstrate the behaviors listed below? Please use the following scale to indicate the frequency. For each of the twelve behaviors listed below, place your rating on the appropriate op-scan sheet.

1	2	3	4	5	6	7
Never	Almost Never	A Few Times	About Half of the Time	Often	Most of the Time	All of the Time

1. Examples were presented which were clearly related to the central topic. -----
2. Lecturer used purposeful nonverbal behaviors (smiled, pointed) to emphasize points. -----
3. Lecturer stopped in midsentence. -----
4. Lecturer was hesitant (said "eh" or "um"). -----
5. Lecturer lost eye contact with audience. -----
6. Lecturer provided facts or evidence to support broad generalizations. -----
7. Lecturer spoke fast. -----
8. Lecturer acted nervous. -----
9. Lecturer spoke in a monotone for a sustained period. -----
10. Lecturer gave clear answers to questions. -----
11. Lecturer varied his facial expressions. -----
12. Lecturer appeared unsure of what he was saying. -----

I.D. _____

Teacher Evaluation Form

Directions: Using the following scale, please rate the instructor you just observed on the tape. For each of the nine categories listed below, place your rating on on the appropriate line on your opscan sheet.

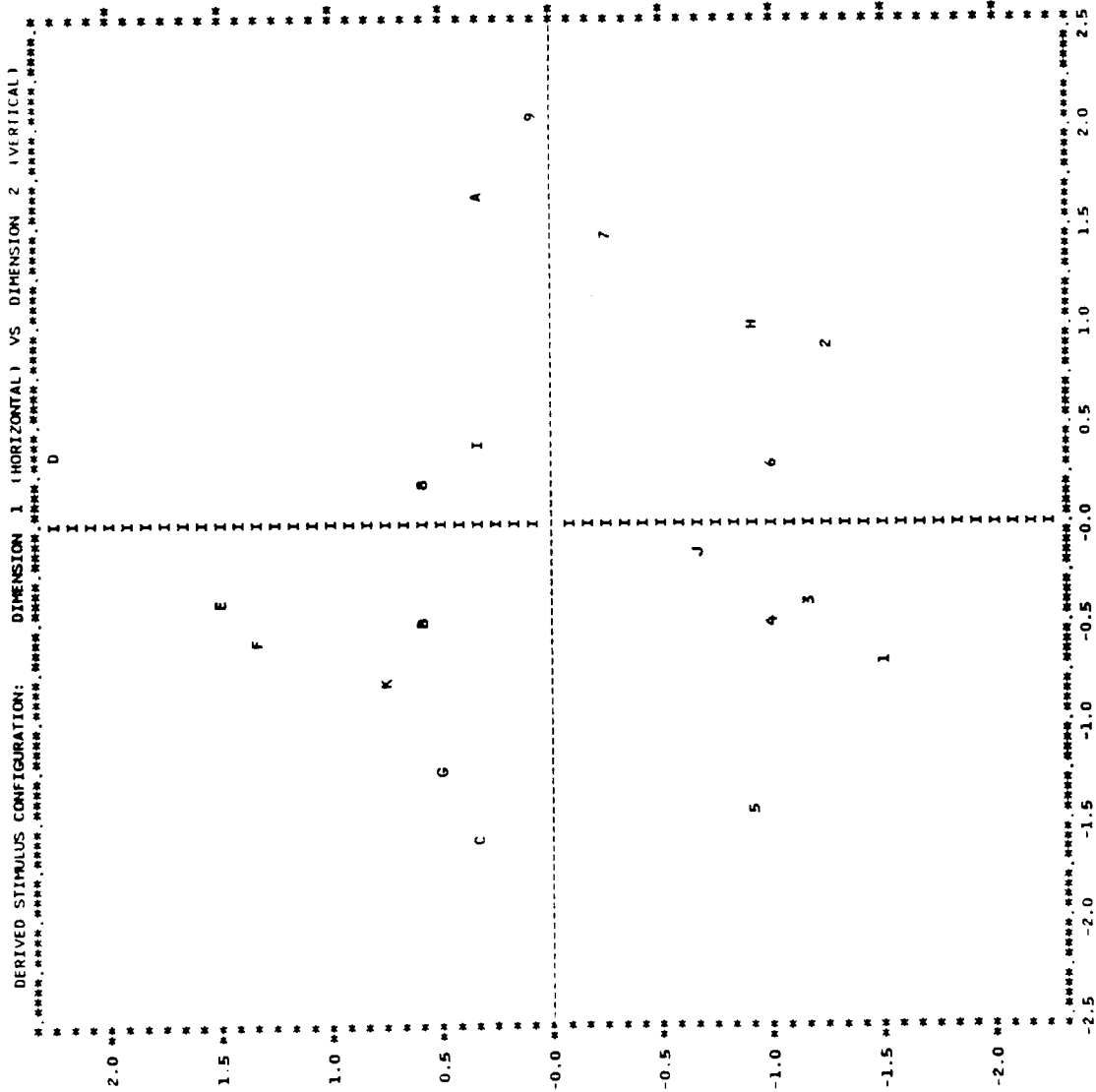
1	2	3	4	5
-----	-----	-----	-----	-----
Very Bad	Poor	Average	Good	Very Good

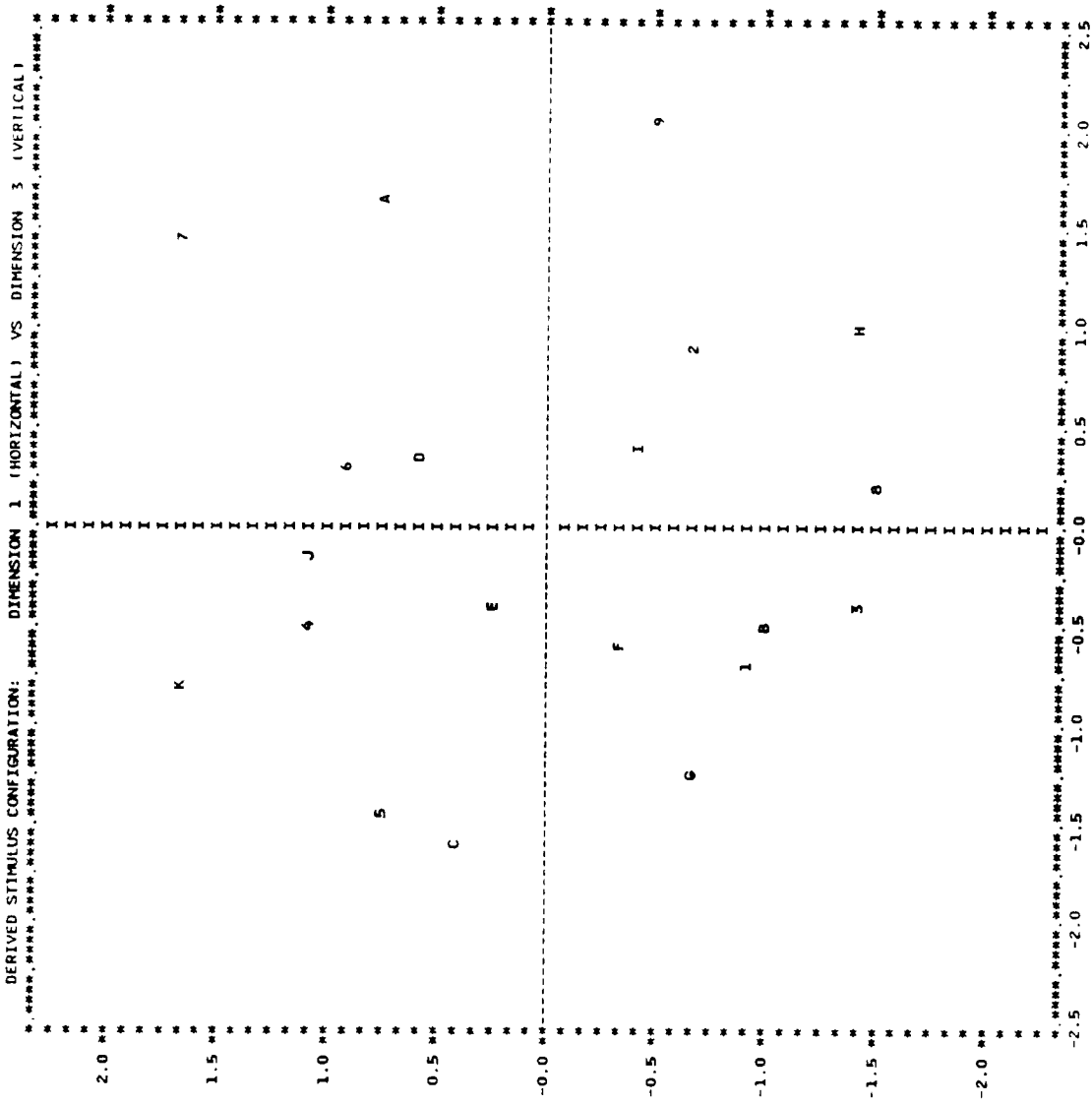
- 13. Thoroughness of preparation -----
- 14. Grasp of material -----
- 15. Organization and clarity -----
- 16. Poise and demeanor -----
- 17. Responsiveness to questions -----
- 18. Educational value of lecture -----
- 19. Rapport with audience -----
- 20. Speaking ability -----
- 21. Overall rating -----

APPENDIX G

PLOTS OF GROUP STIMULUS SPACE: INDSCAL AND ALSICAL

INDSCAL OVERALL

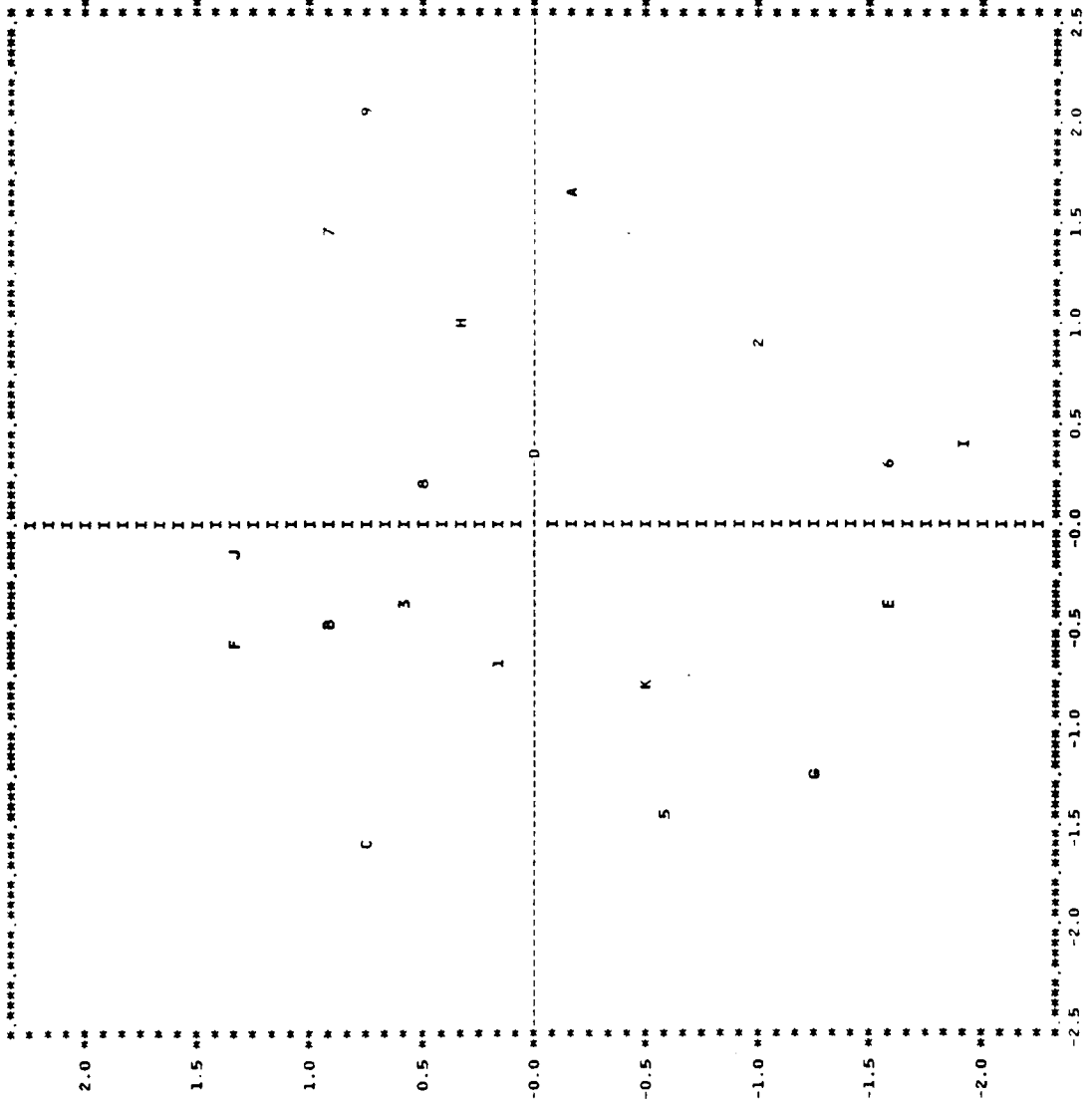




INDSCAL OVERALL

1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor

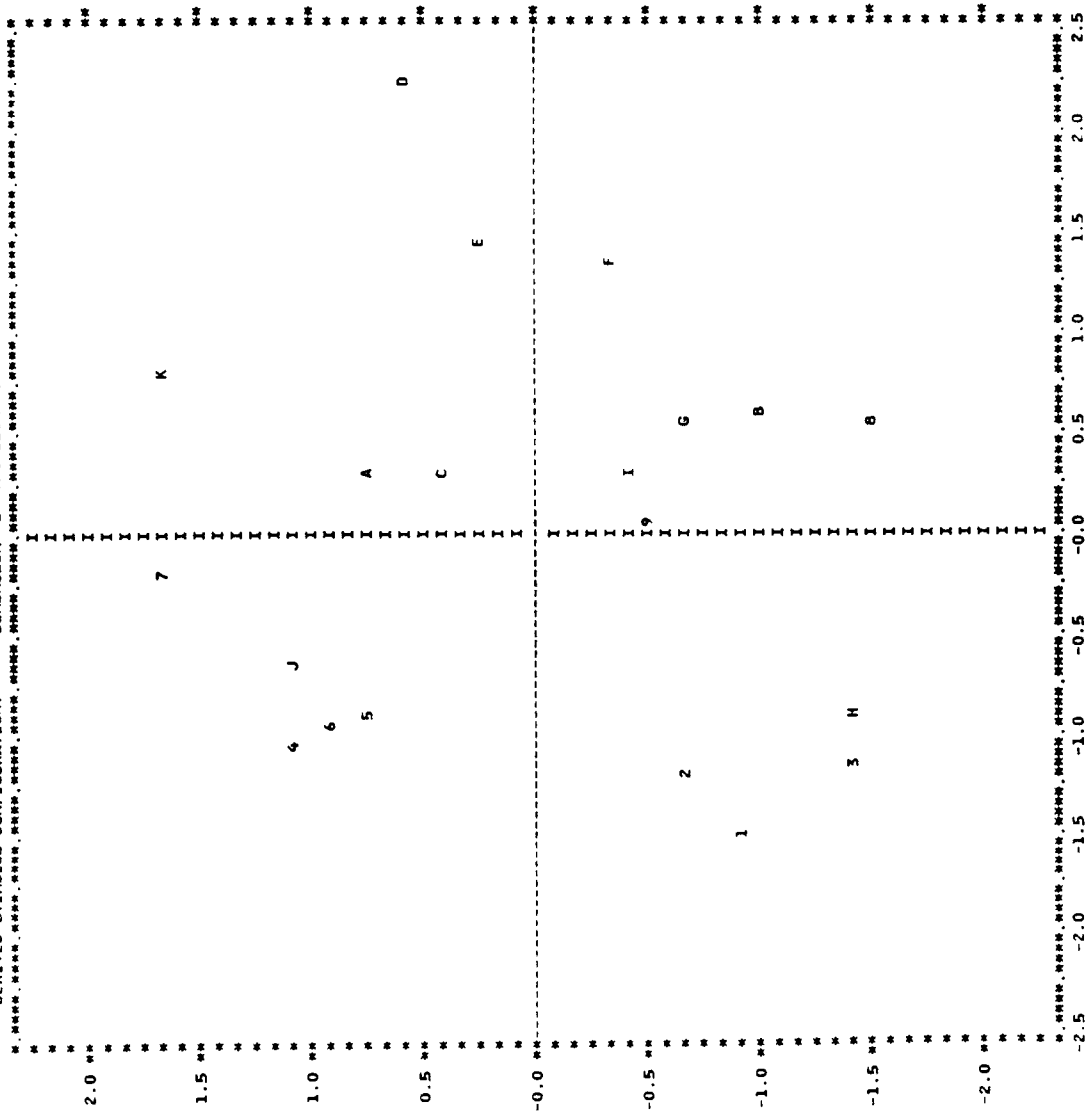
DERIVED STIMULUS CONFIGURATION: DIMENSION 1 (HORIZONTAL) VS DIMENSION 4 (VERTICAL)



INDSCAL OVERALL

1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor

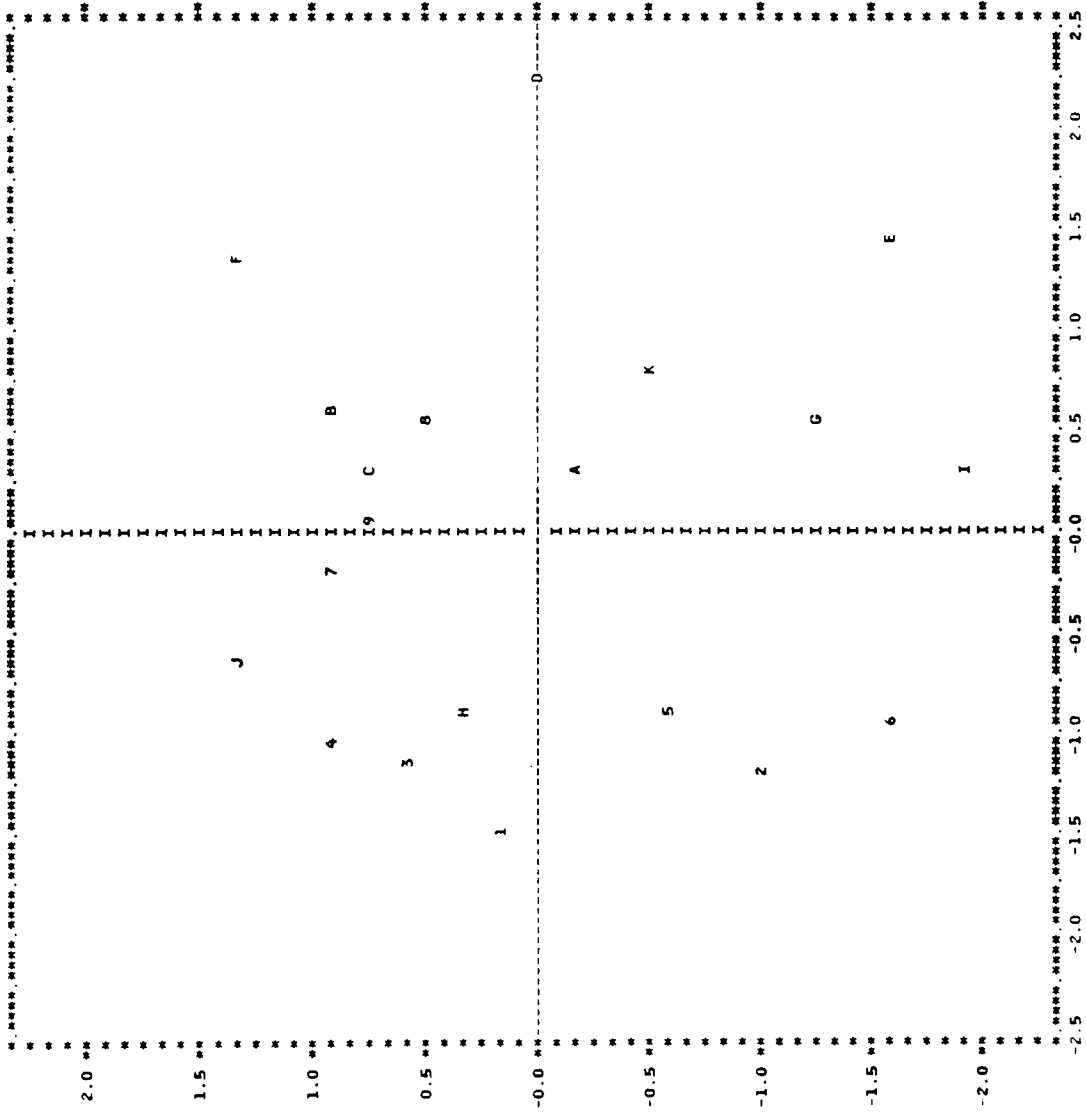
DERIVED STIMULUS CONFIGURATION: DIMENSION 2 (HORIZONTAL) VS DIMENSION 3 (VERTICAL)



INDSCAL OVERALL

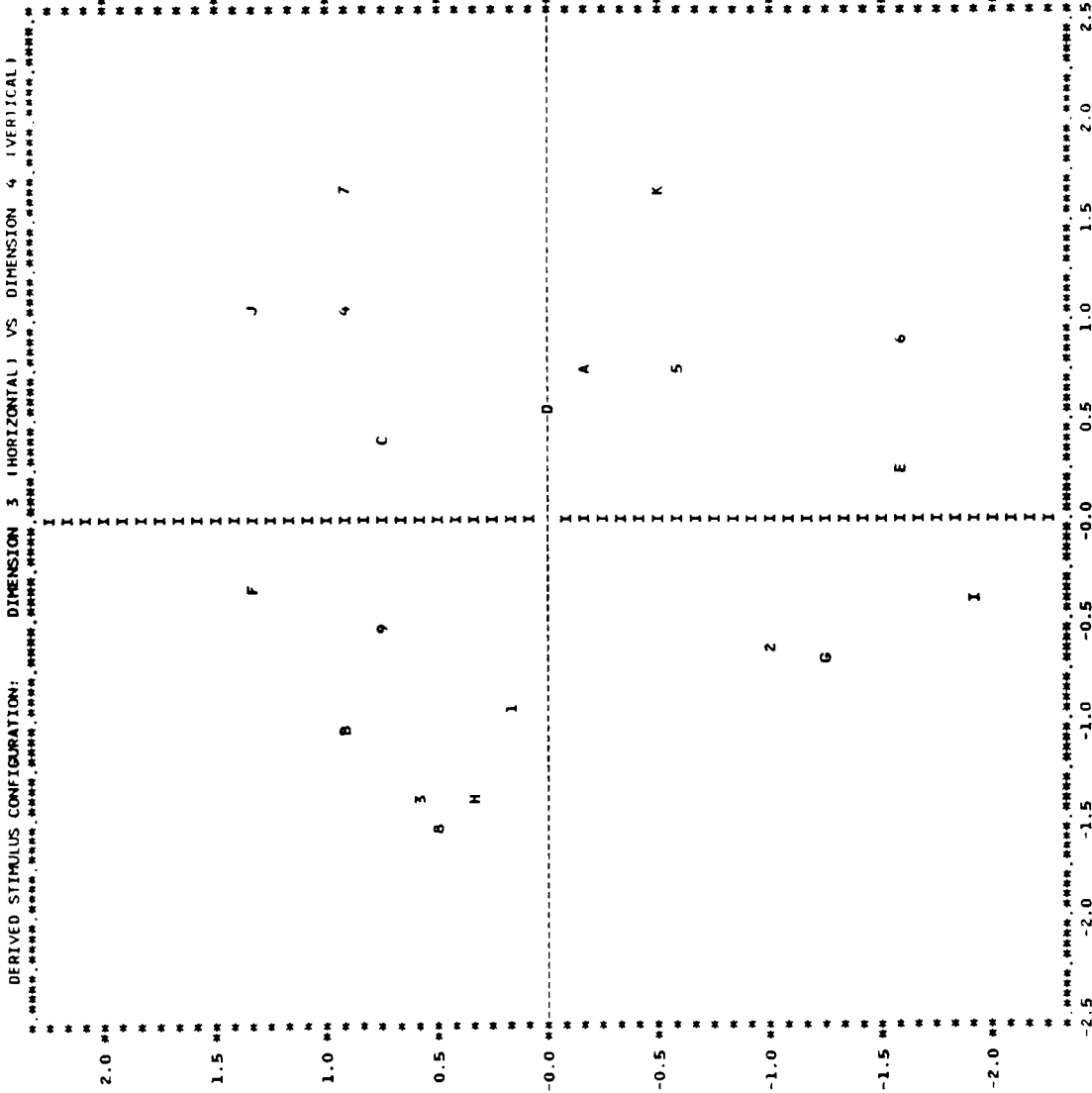
1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor

DERIVED STIMULUS CONFIGURATION: DIMENSION 2 (HORIZONTAL) VS DIMENSION 4 (VERTICAL)



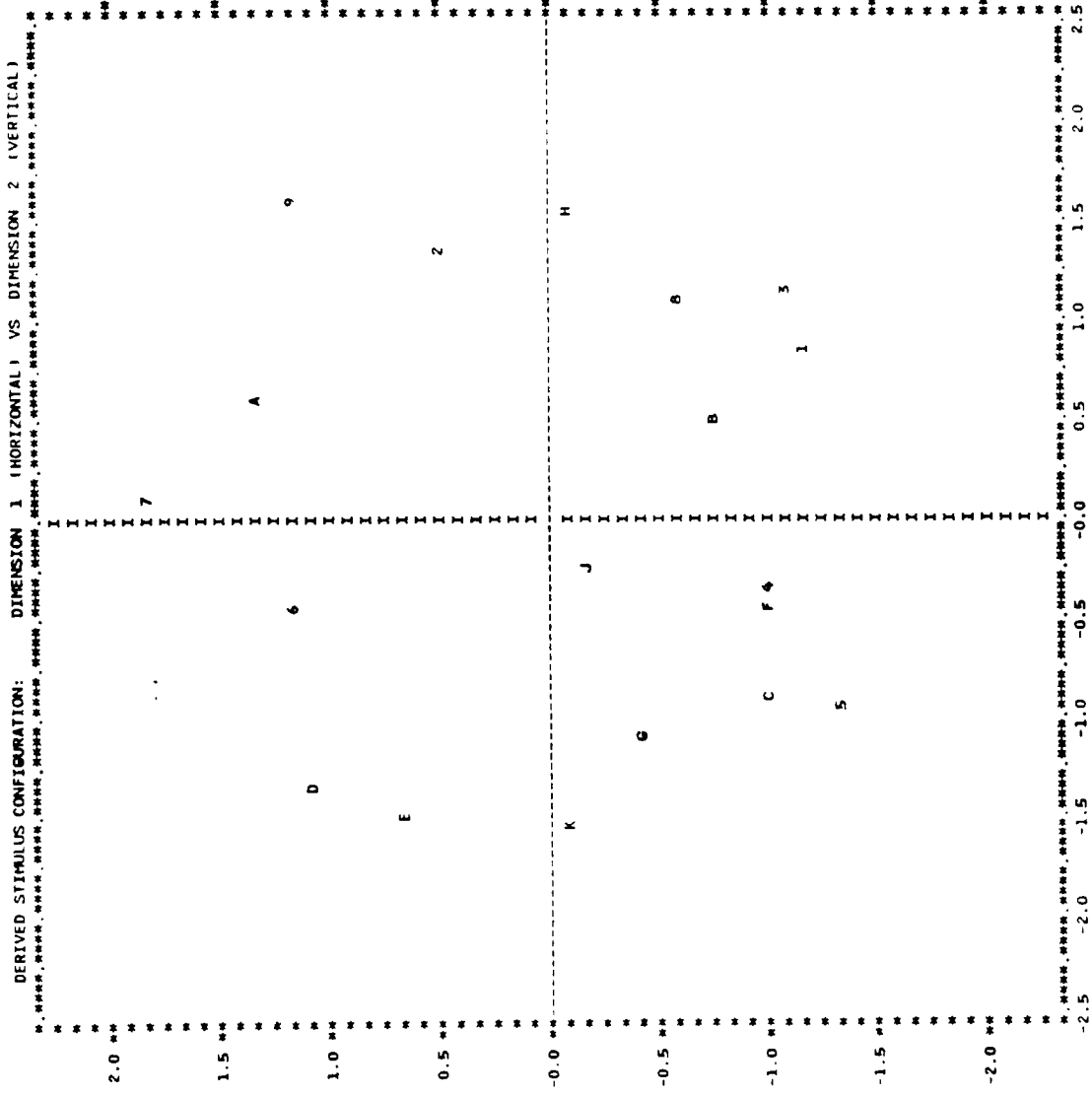
INDSCAL OVERALL

1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor



INDUSCAL OVERALL.

1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor

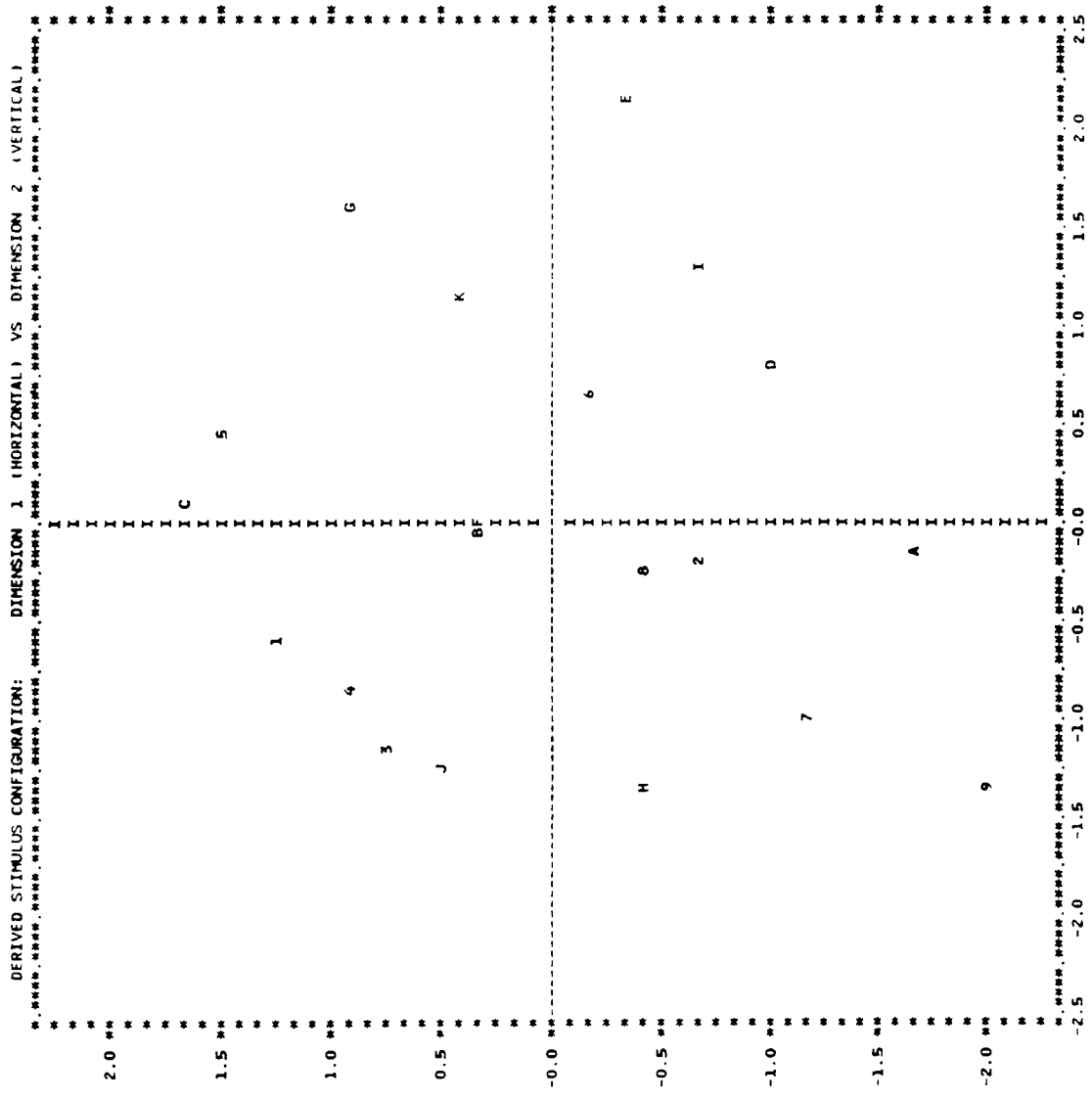


ALSCAL OVERALL

1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor

APPENDIX H

ADDITIONAL PLOTS OF GROUP STIMULUS SPACE FOR FOUR SUBSETS

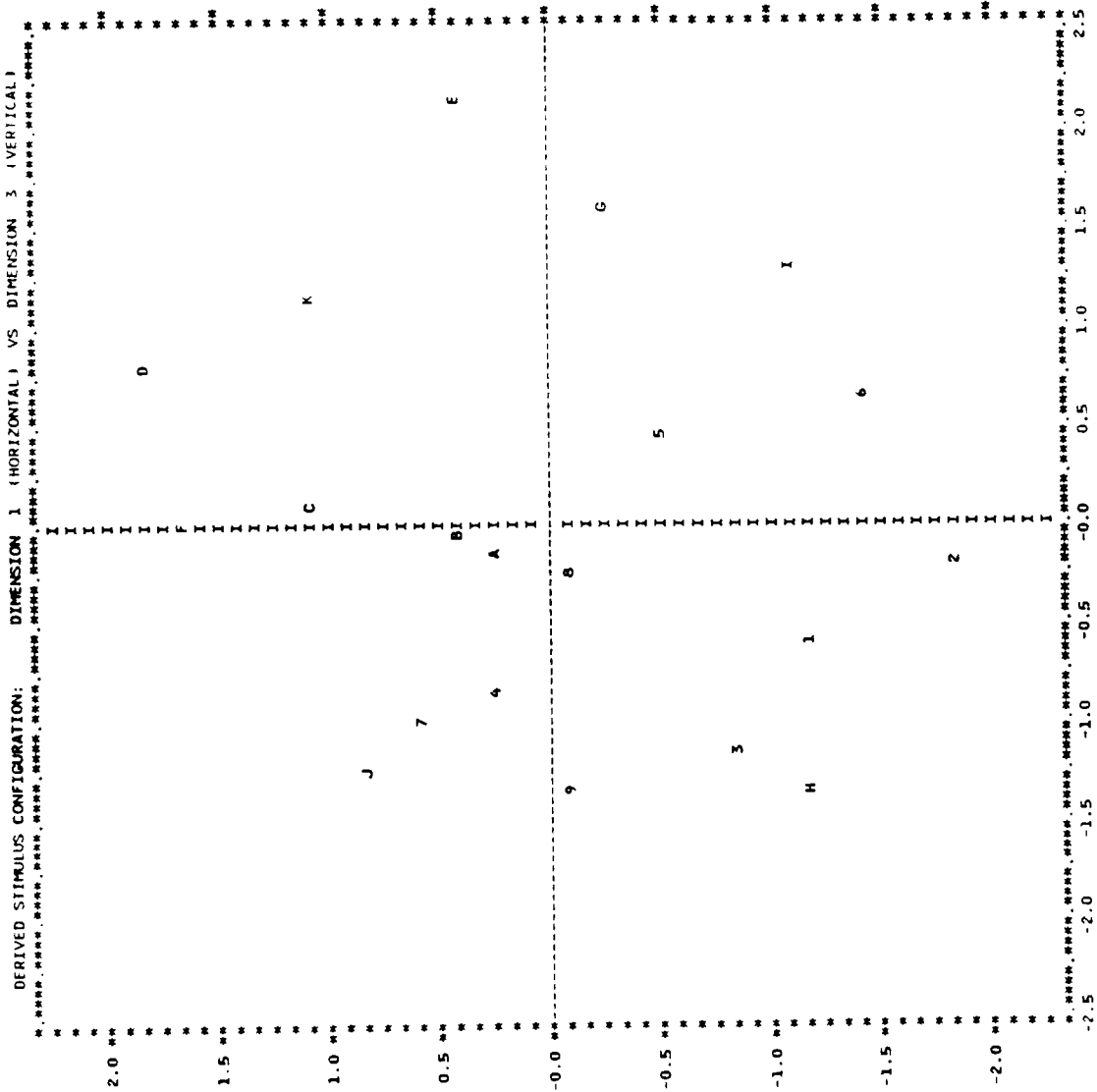


INDSCAL, SUBSET A

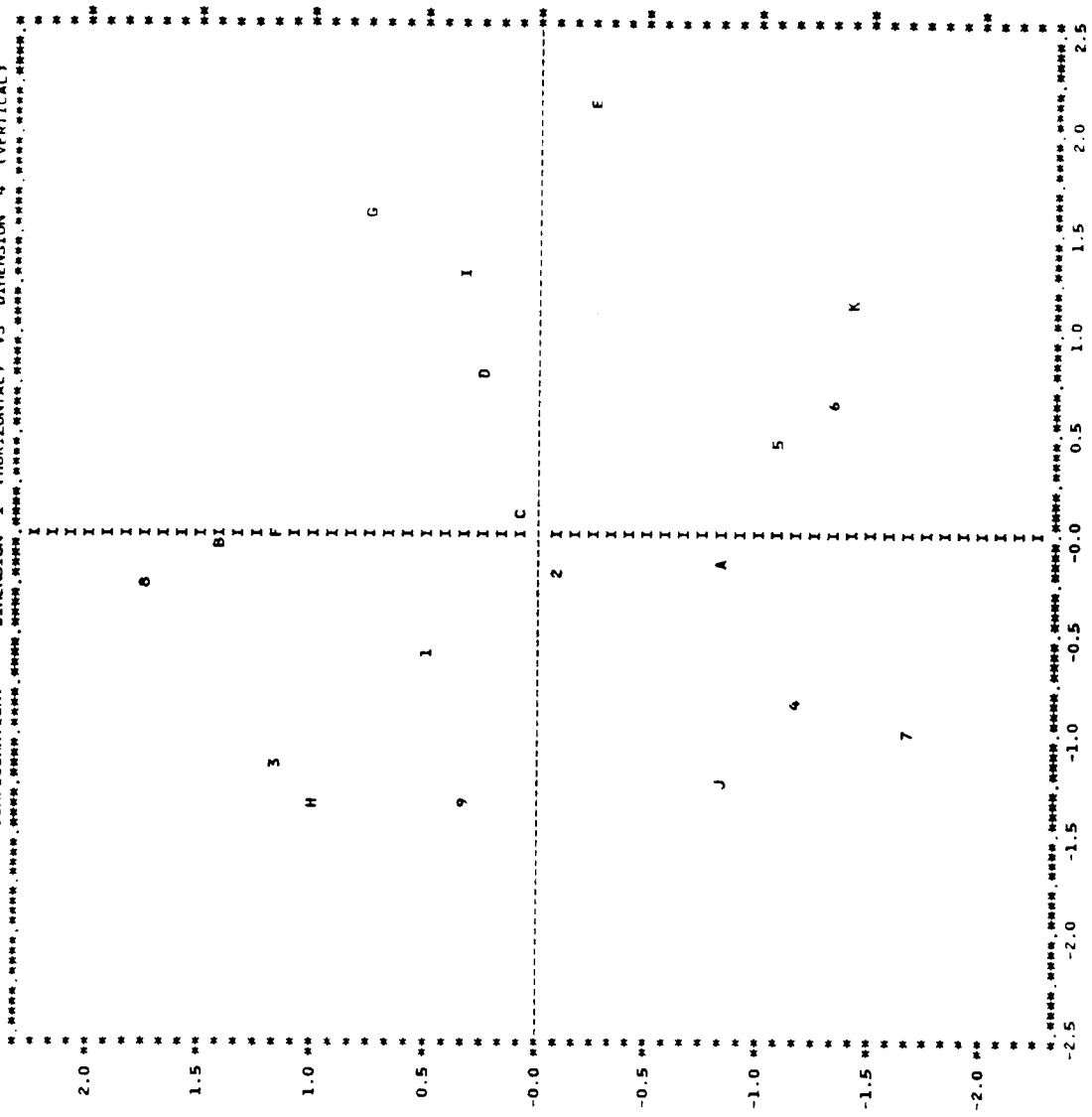
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2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor

INDSCAL SUBSET A

- 1. Cashier
- 2. Retail Manager
- 3. Bank Teller
- 4. Waiter/Waitress
- 5. Cook
- 6. Tailor
- 7. Actor
- 8. File Clerk
- 9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor

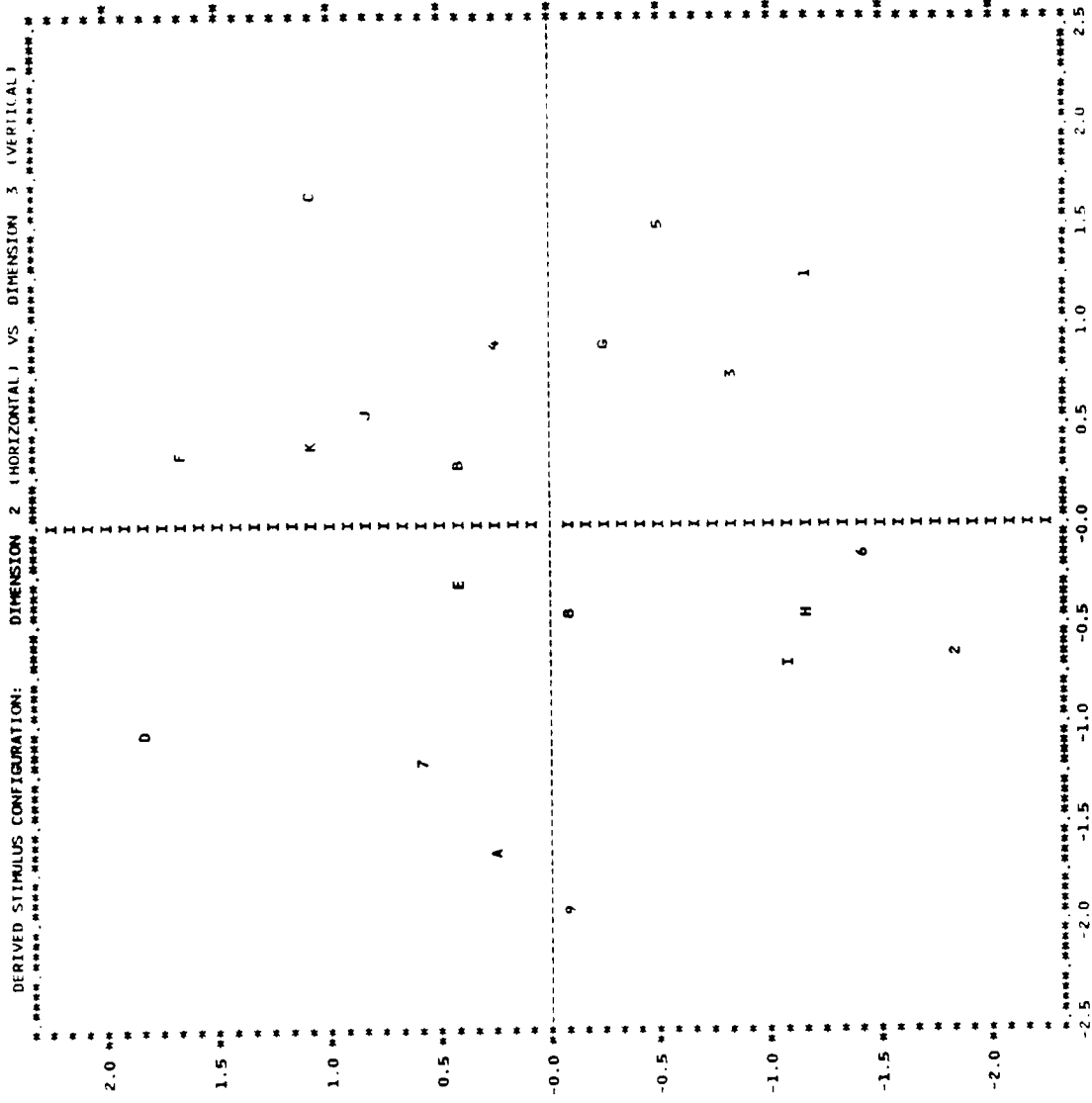


DERIVED STIMULUS CONFIGURATION: DIMENSION 1 (HORIZONTAL) VS DIMENSION 4 (VERTICAL)



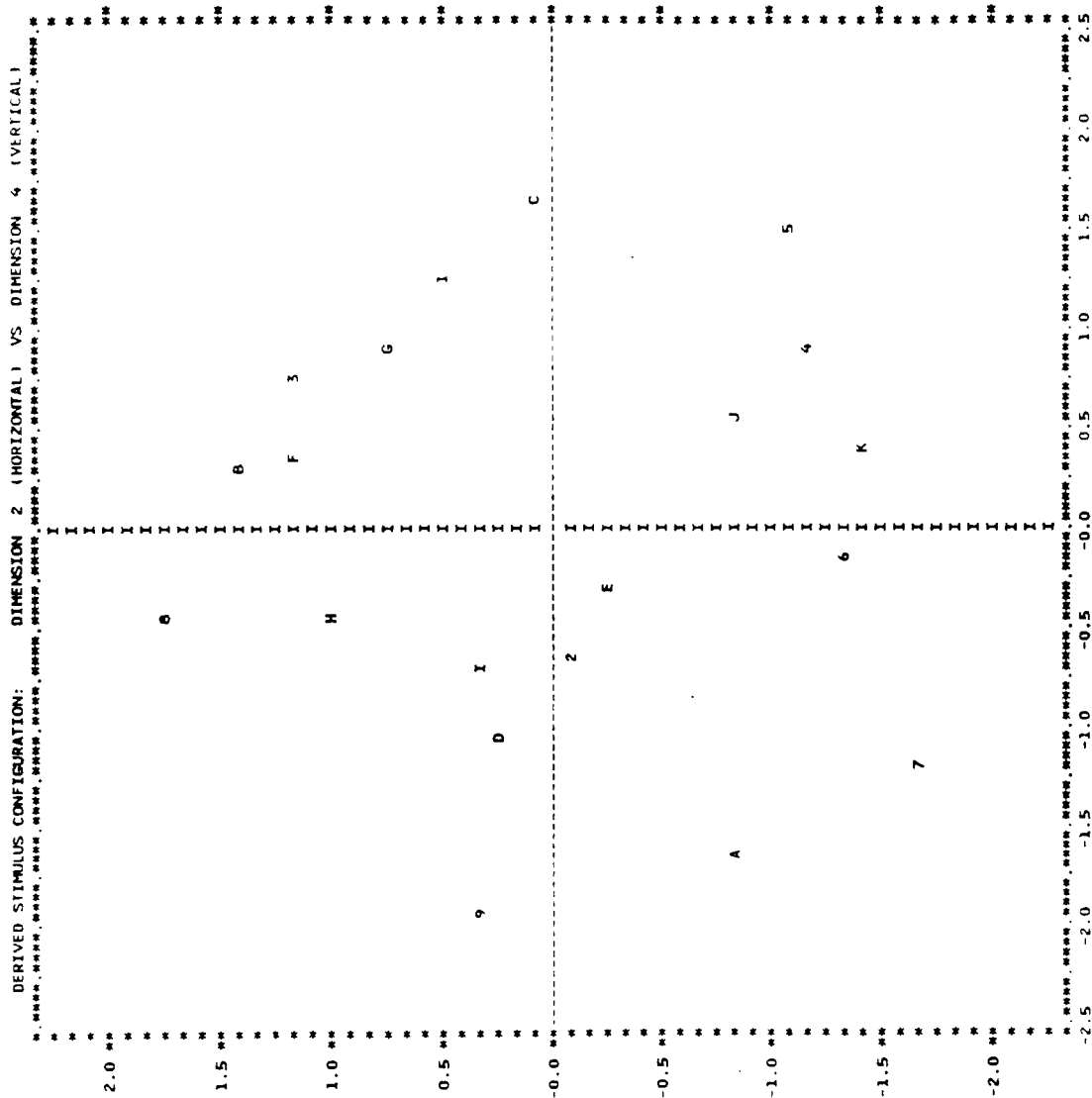
INDSCAL SUBSET A

1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor



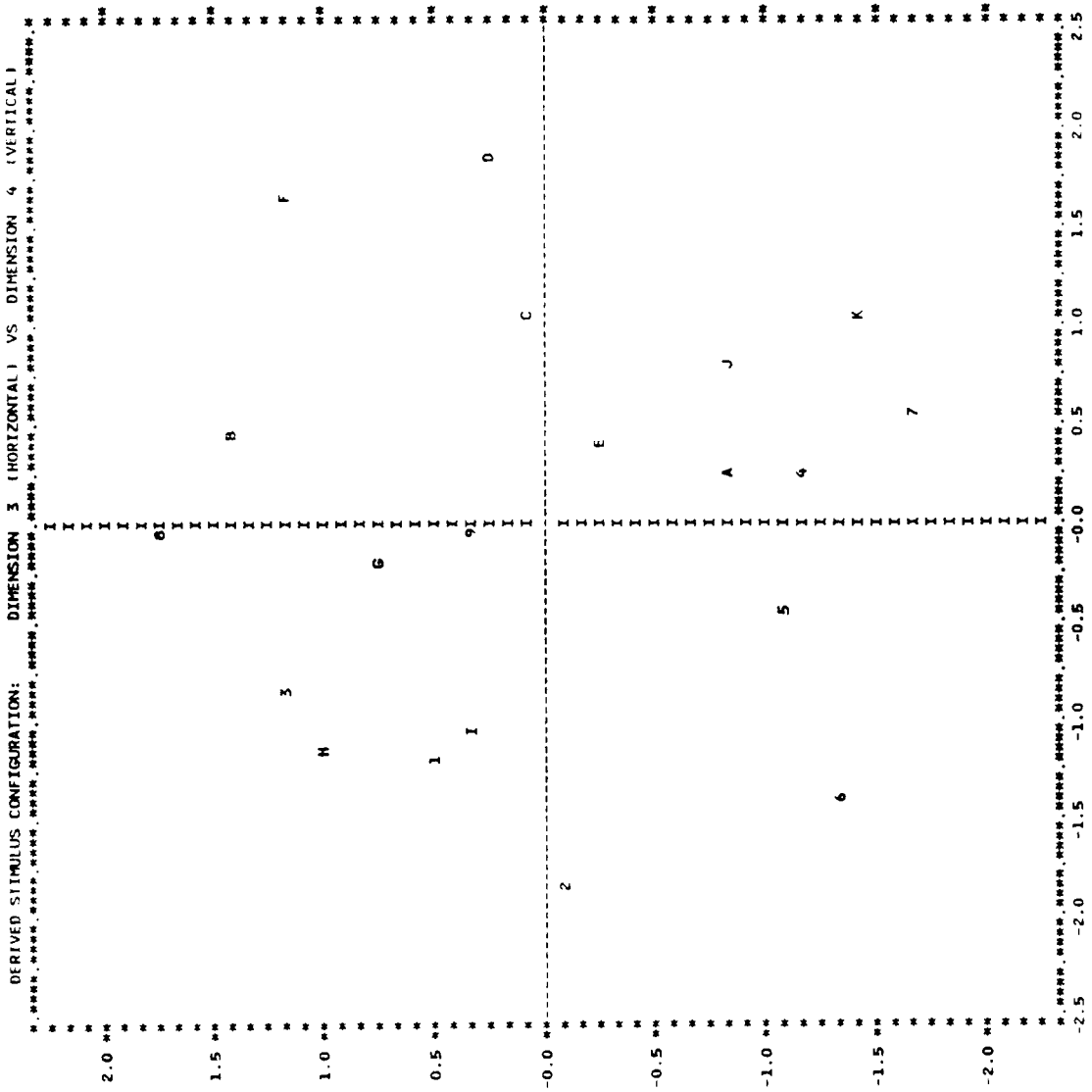
INDSCAL SUBSET A

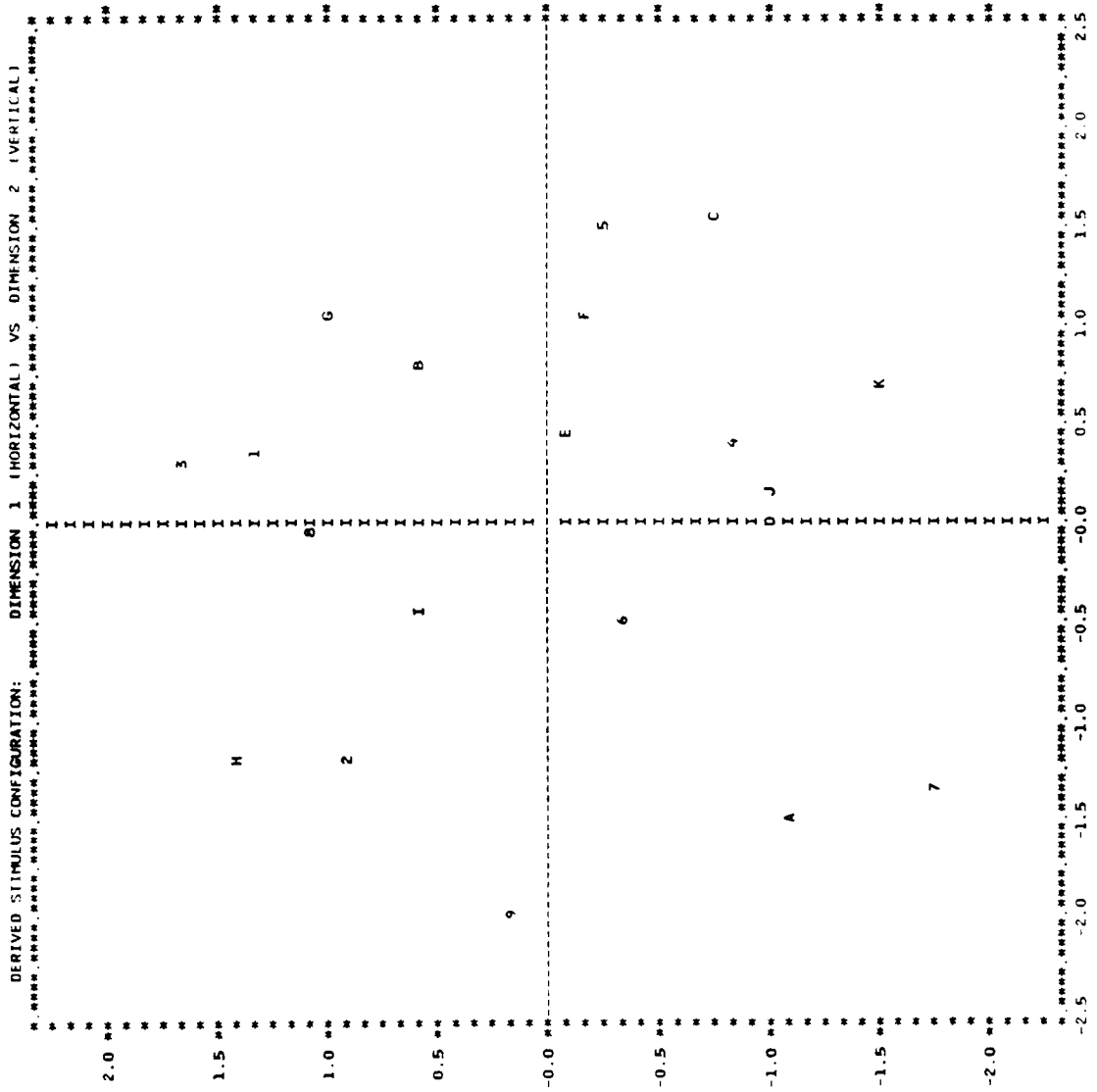
- 1. Cashier
- 2. Retail Manager
- 3. Bank Teller
- 4. Waiter/Waitress
- 5. Cook
- 6. Tailor
- 7. Actor
- 8. File Clerk
- 9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
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- J. Flight Attendant
- K. Janitor



INDSCAL SUBSET A

- 1. Cashier
- 2. Retail Manager
- 3. Bank Teller
- 4. Waiter/Waitress
- 5. Cook
- 6. Tailor
- 7. Actor
- 8. File Clerk
- 9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor



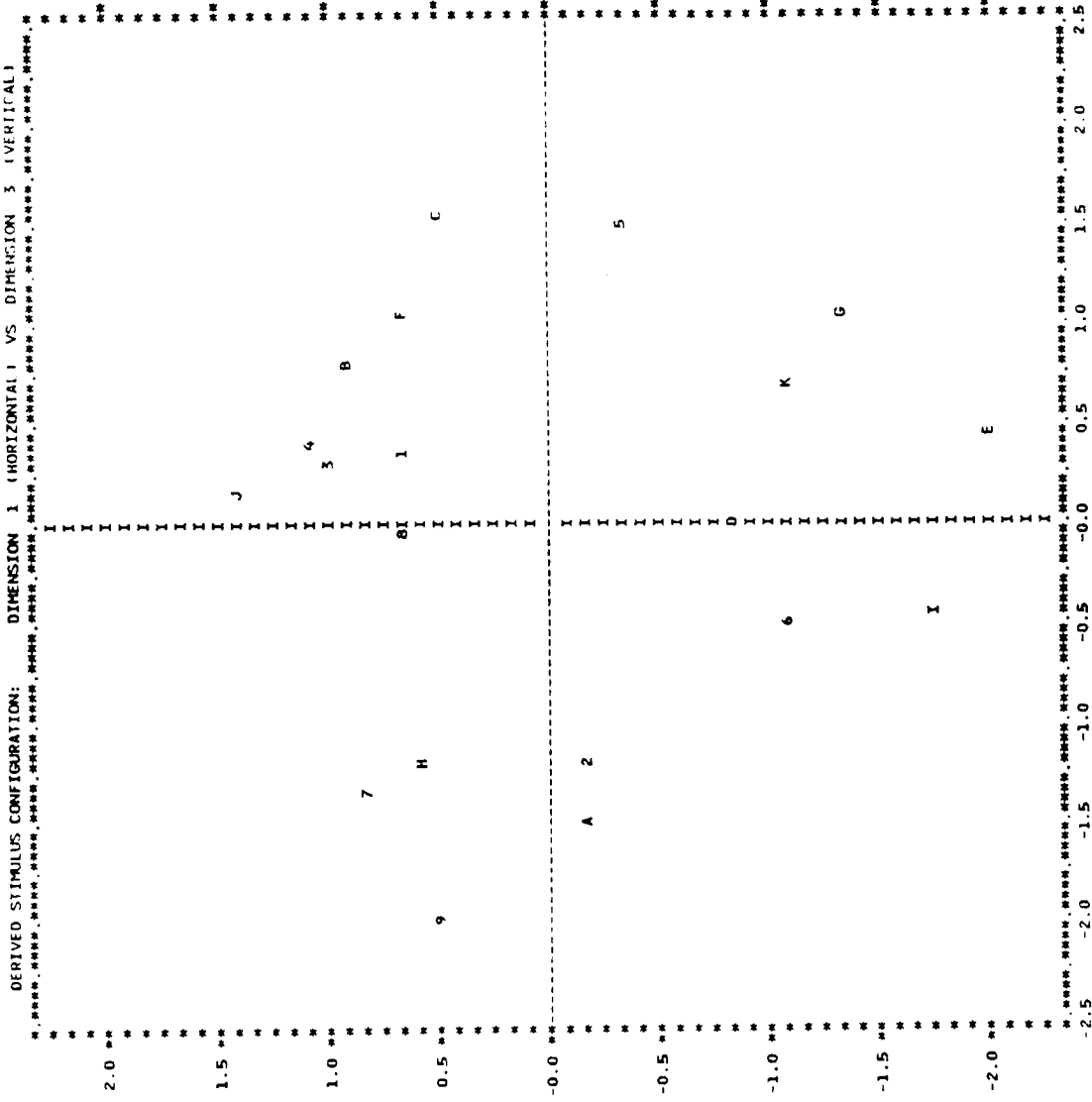


INDSCAL. SUBSET B

1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor

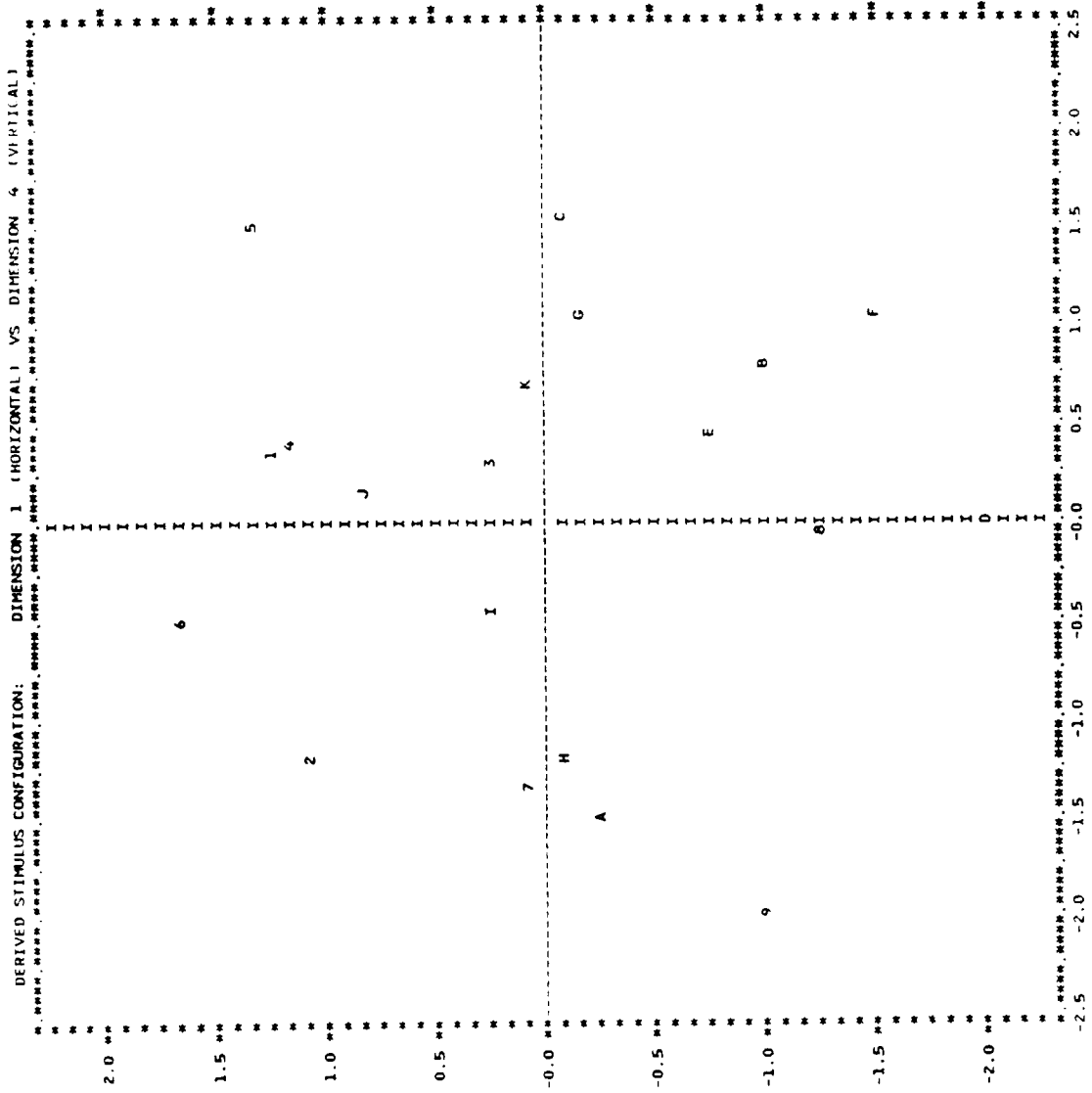
INDSCAL, SUBSET B

- 1. Cashier
- 2. Retail Manager
- 3. Bank Teller
- 4. Waiter/Waitress
- 5. Cook
- 6. Tailor
- 7. Actor
- 8. File Clerk
- 9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor



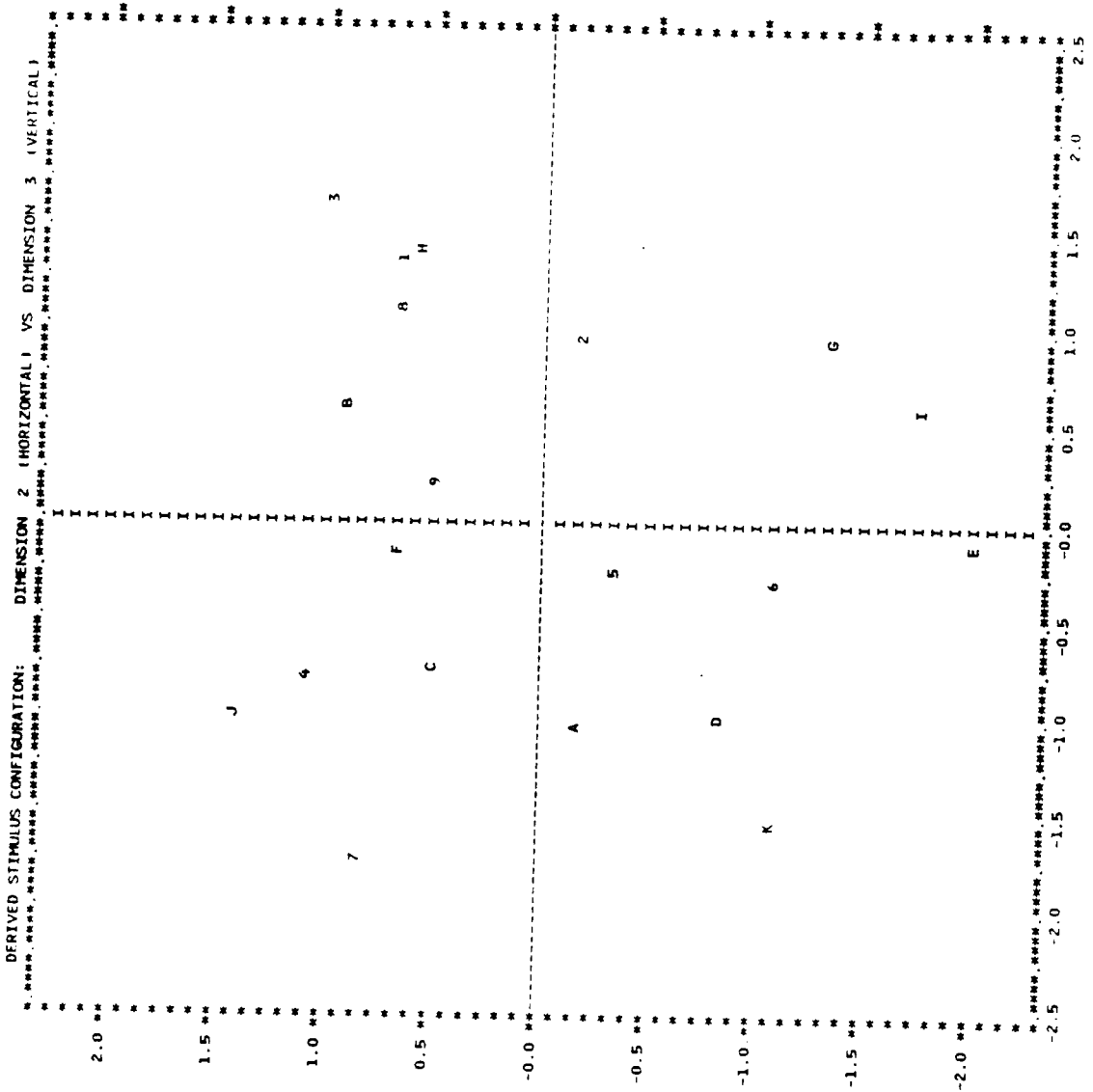
INDSCAL, SUBSET B

1. Cashier
2. Retail Manager
3. Bank Teller
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5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
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- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor

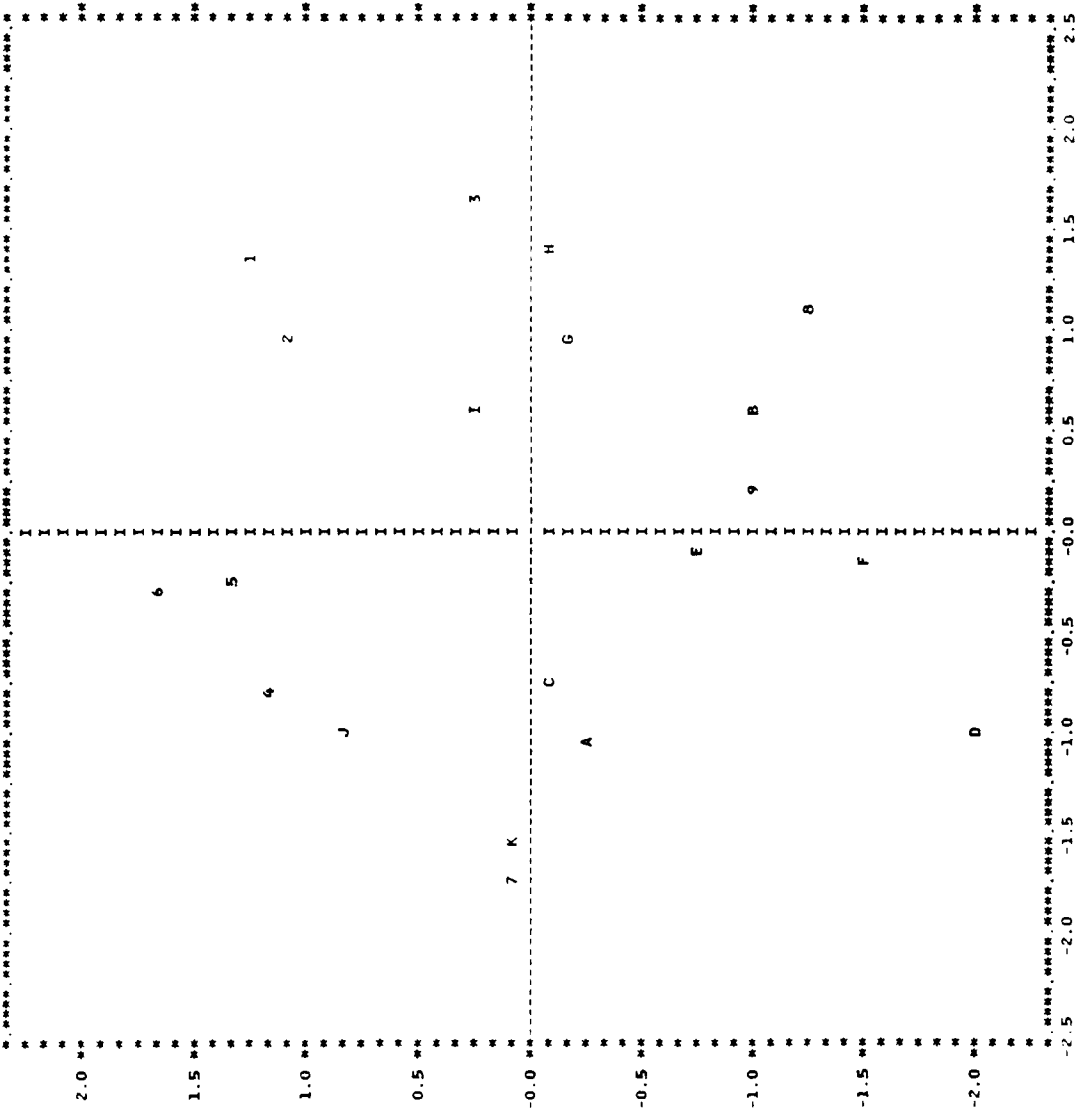


INDSCAL SUBSET B

- 1. Cashier
- 2. Retail Manager
- 3. Bank Teller
- 4. Waiter/Waitress
- 5. Cook
- 6. Tailor
- 7. Actor
- 8. File Clerk
- 9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor



DERIVED STIMULUS CONFIGURATION: DIMENSION 2 (HORIZONTAL) VS DIMENSION 4 (VERTICAL)

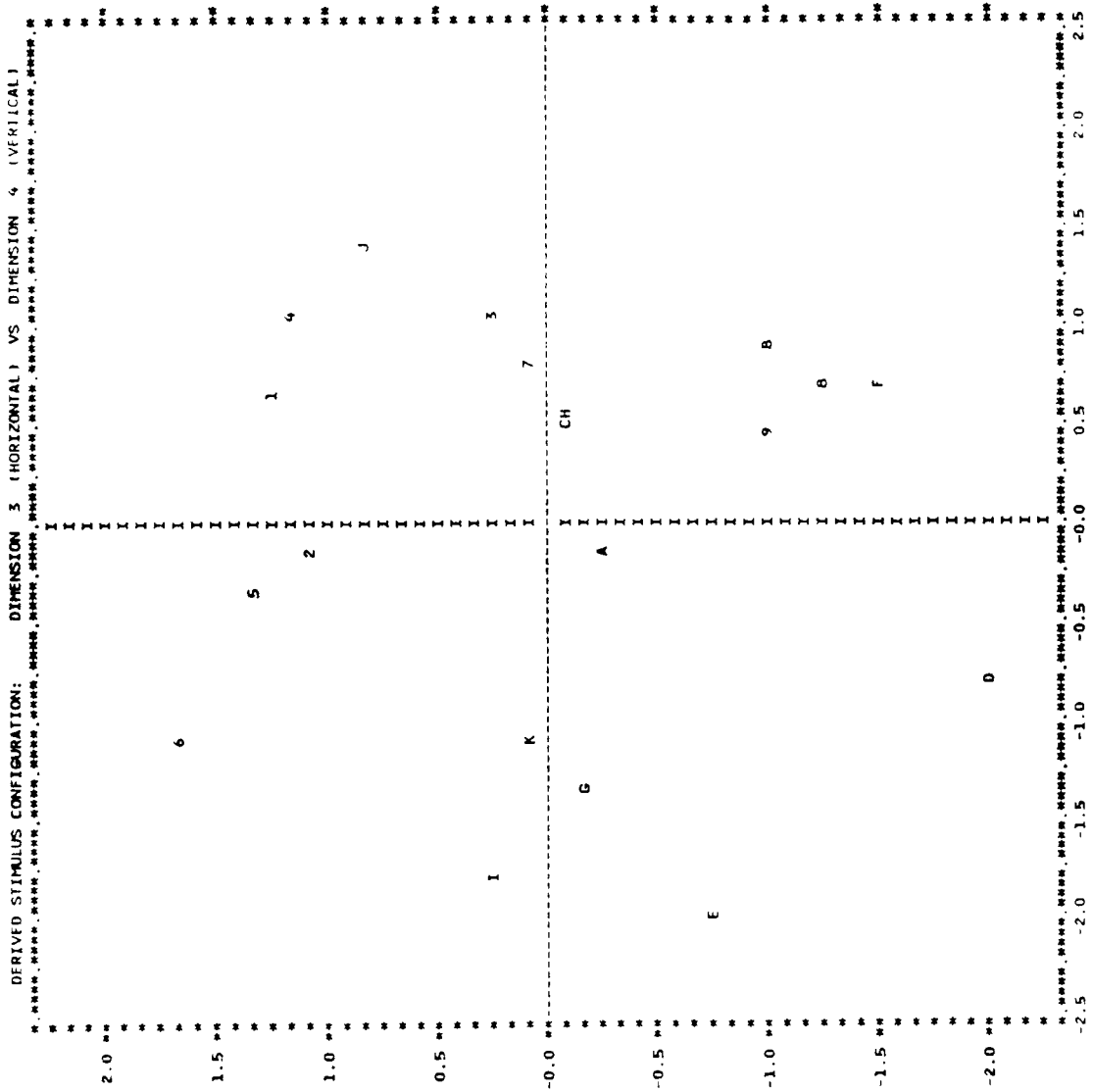


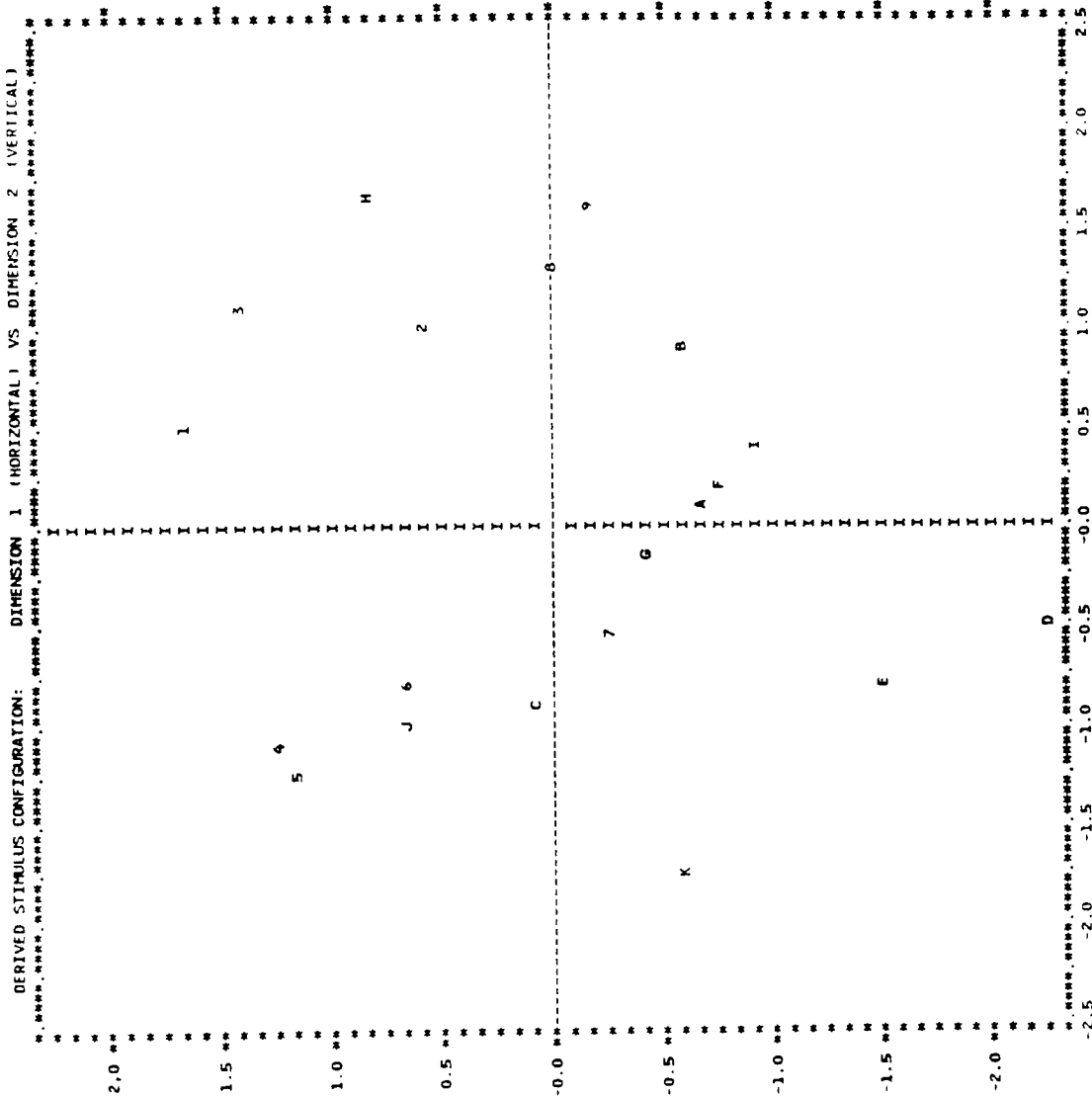
INDSCAL SUBSET B

1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor

INDSCAL. SUBSET B

1. Cashier
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- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor



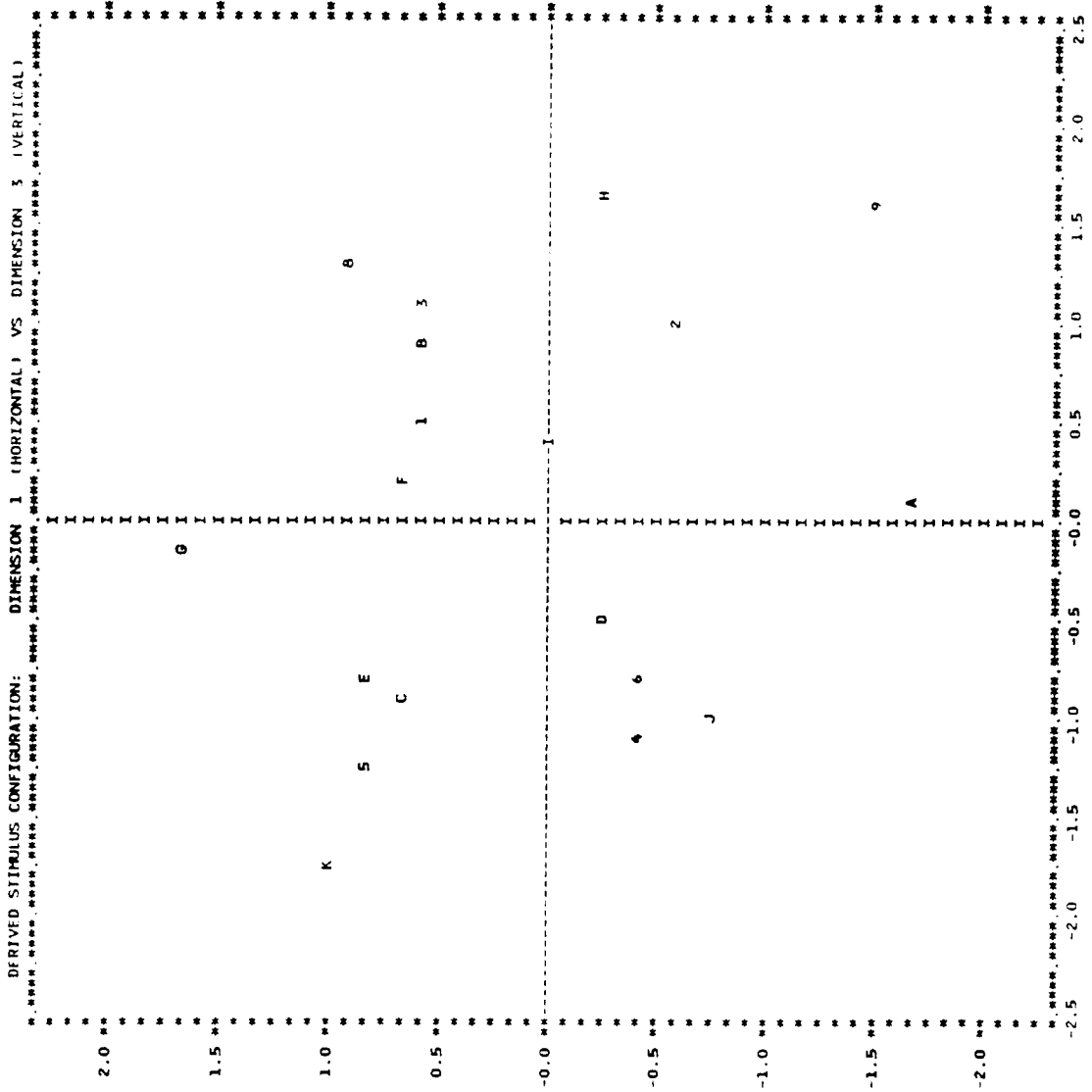


INDSCAL SUBSET C

1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor

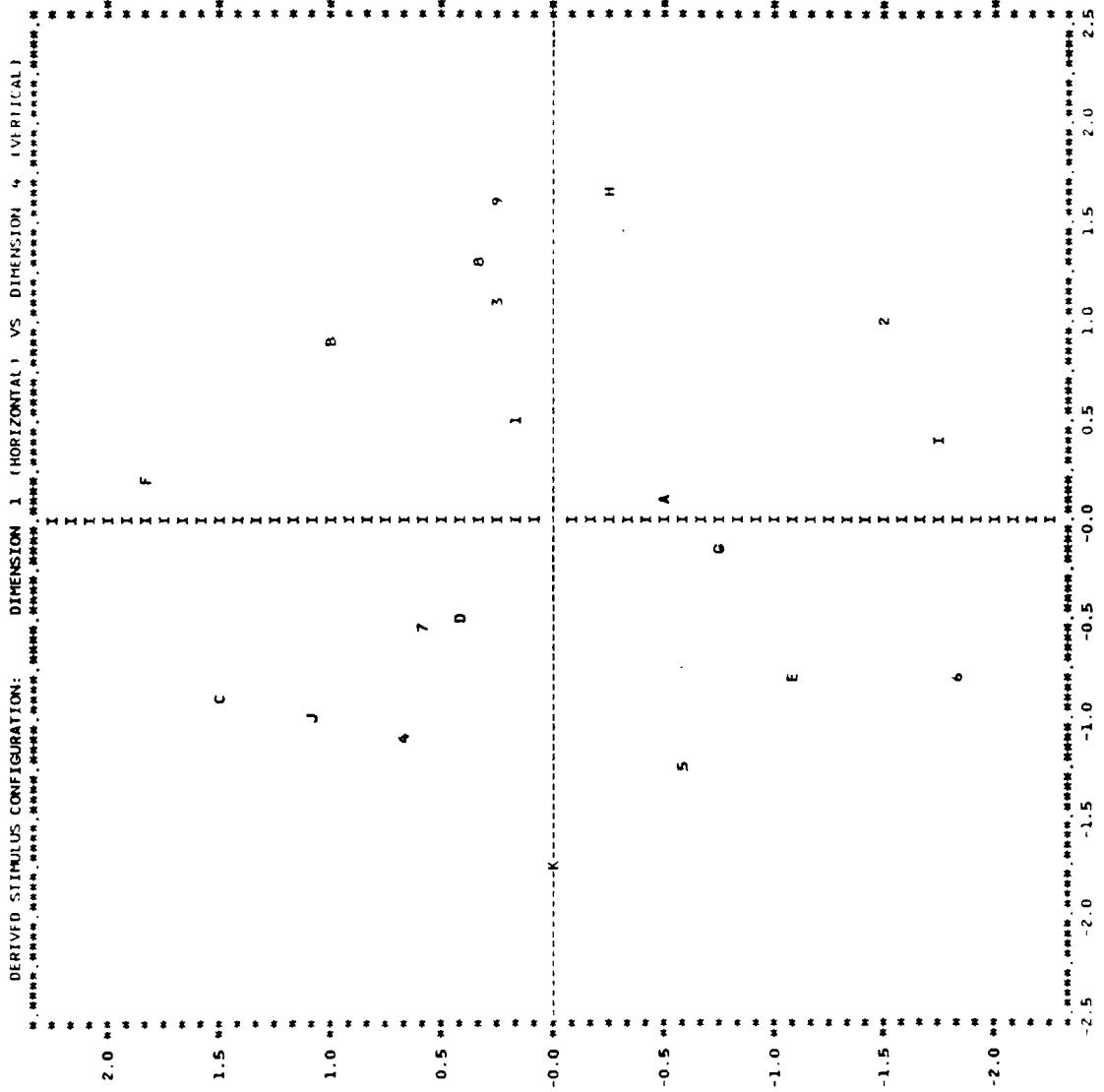
INDSCAL, SUBSET C

1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor

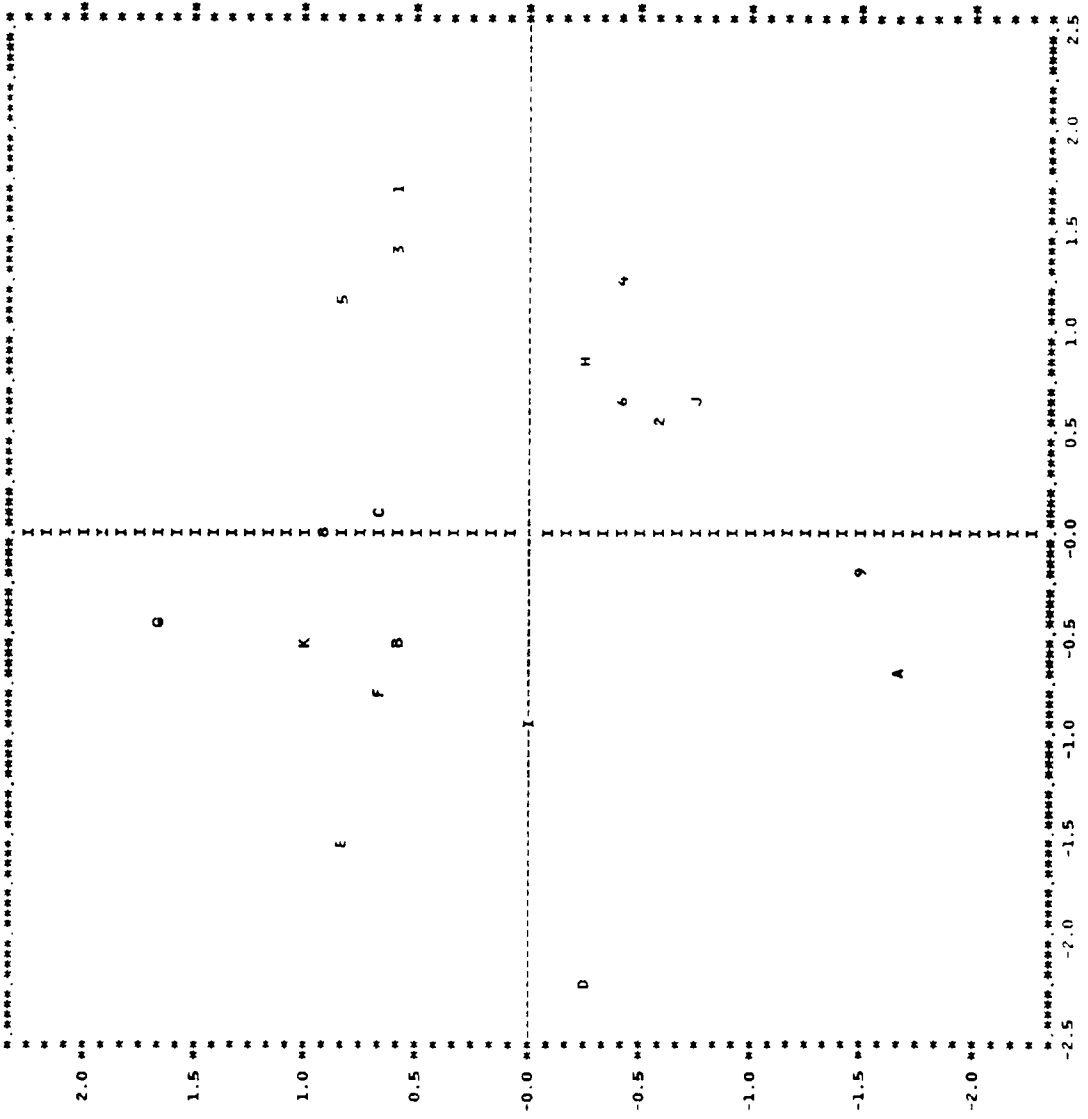


INDSCAL, SUBSET C

1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
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- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
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- J. Flight Attendant
- K. Janitor

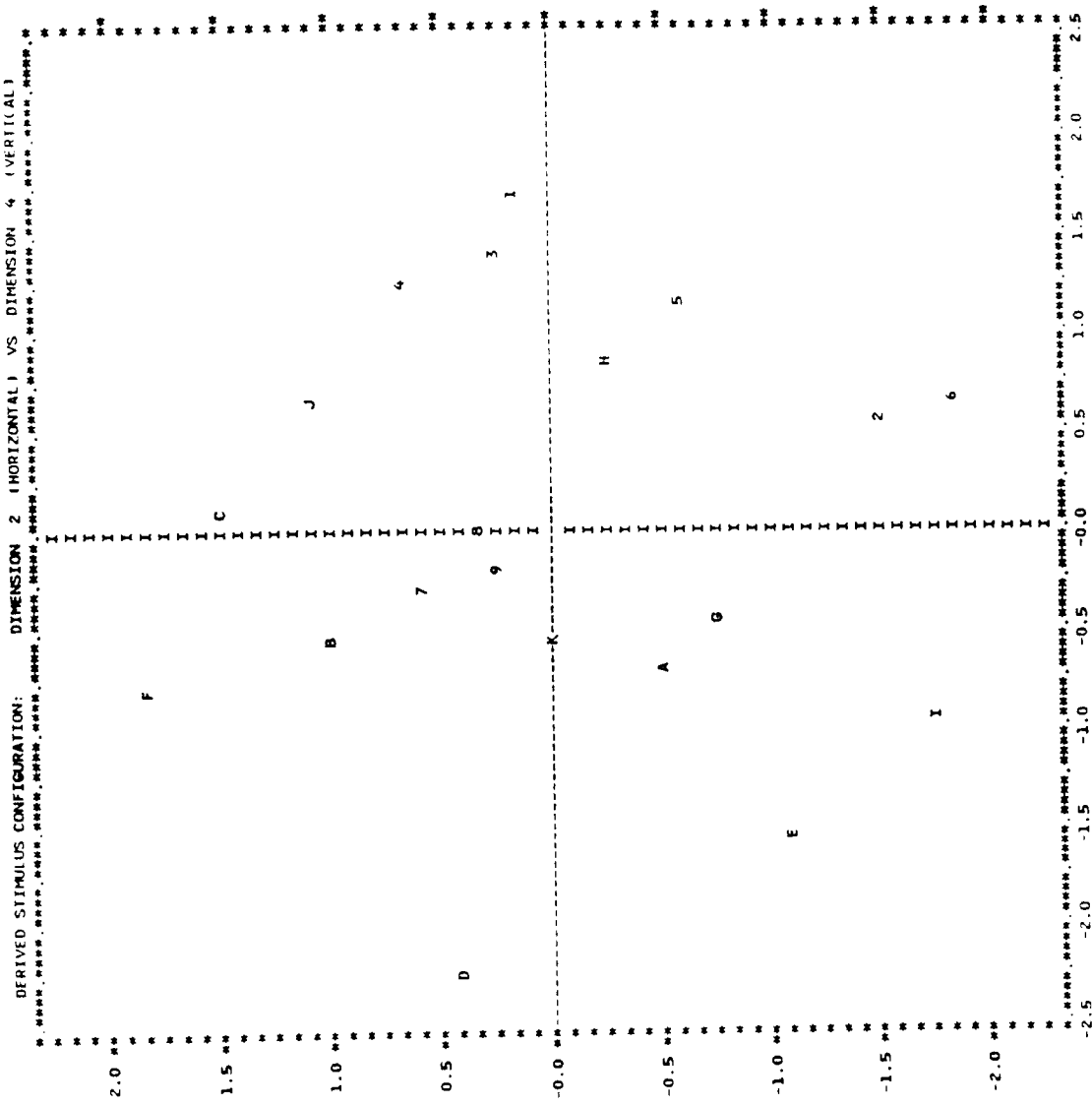


DERIVED STIMULUS CONFIGURATION: DIMENSION 2 (HORIZONTAL) VS. DIMENSION 3 (VERTICAL)



INDSCAL SUBSET C

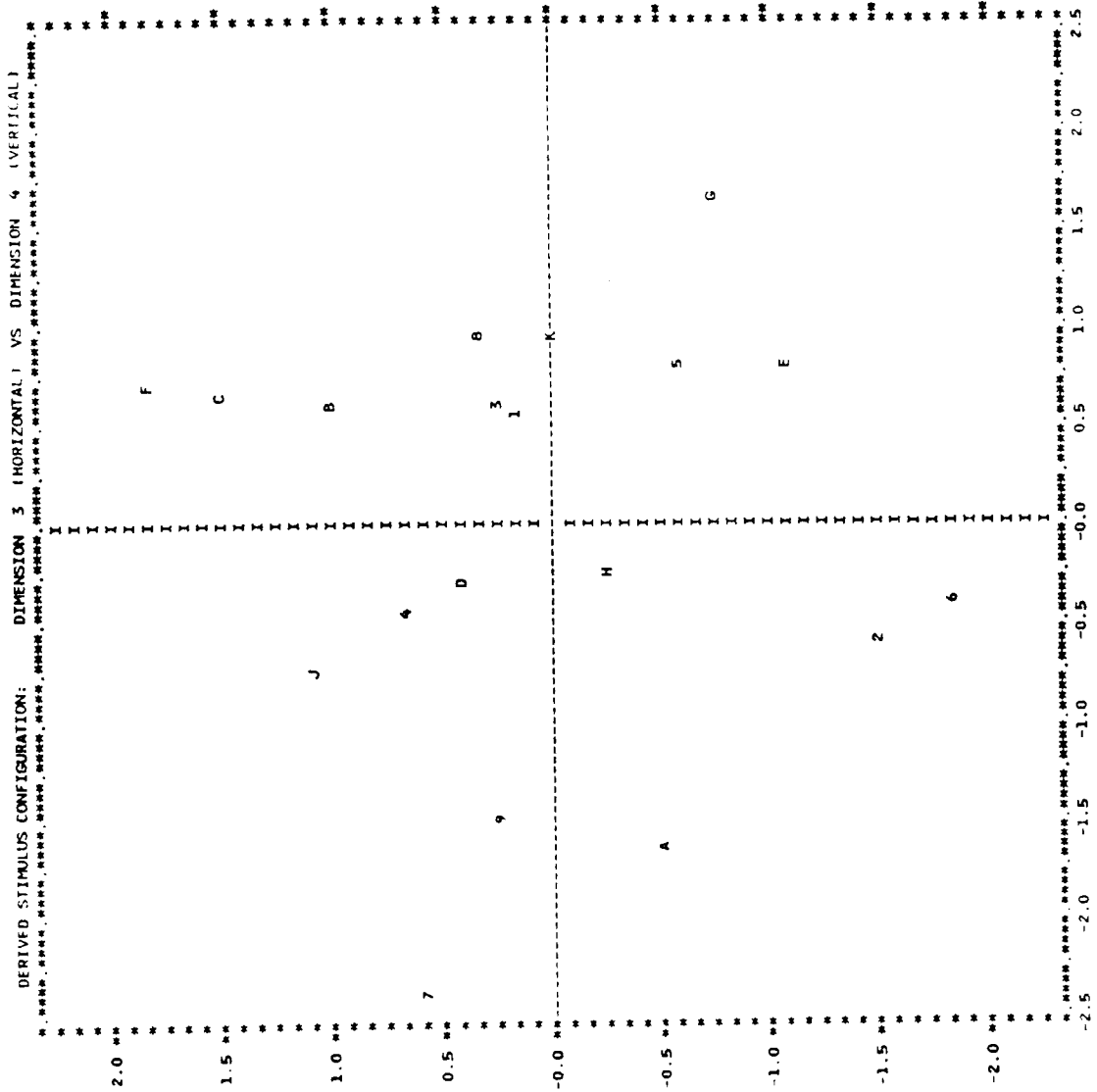
1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor

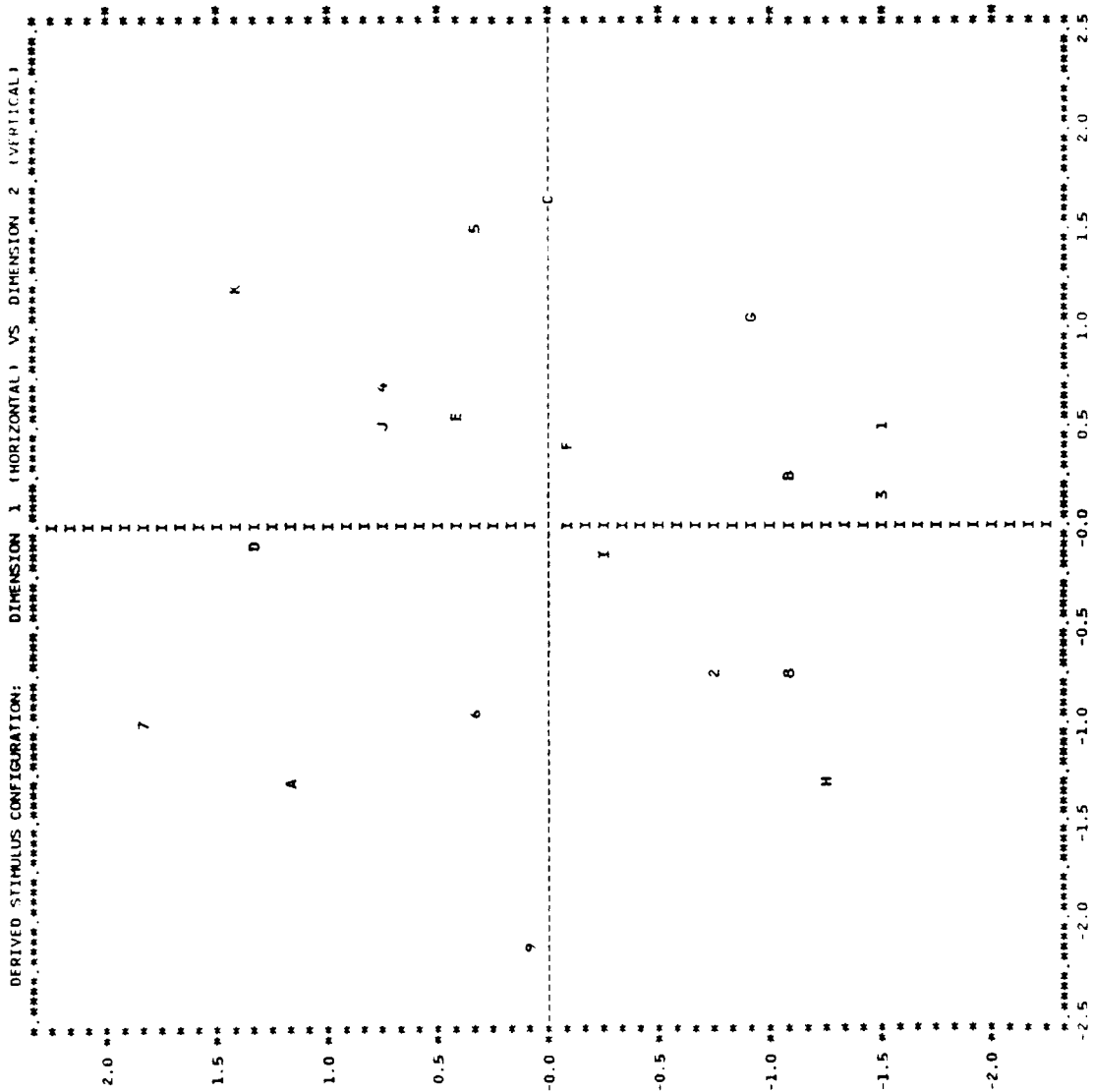


INDSCAL SUBSET C

1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor

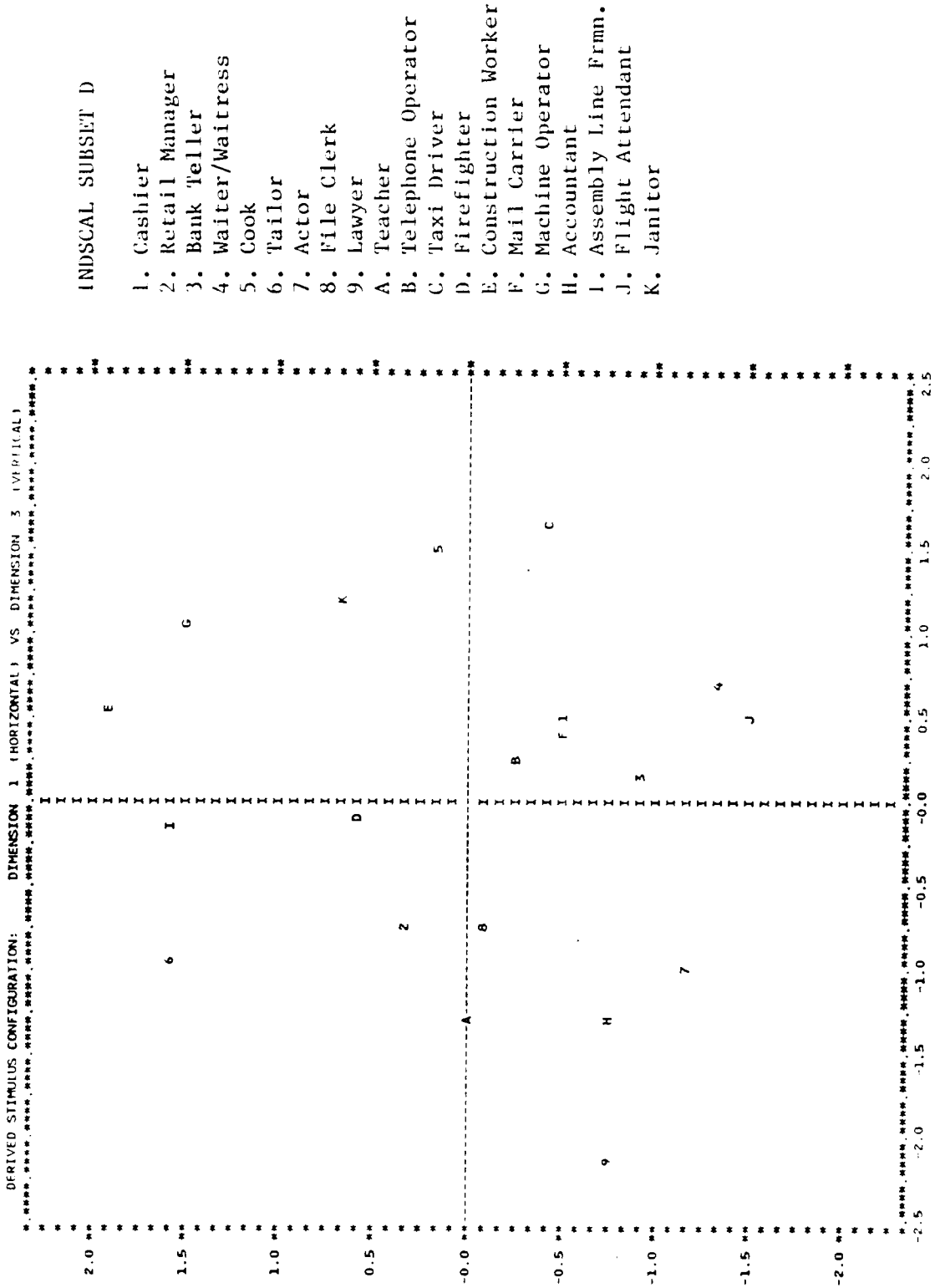
INDSCAL SUBSET C

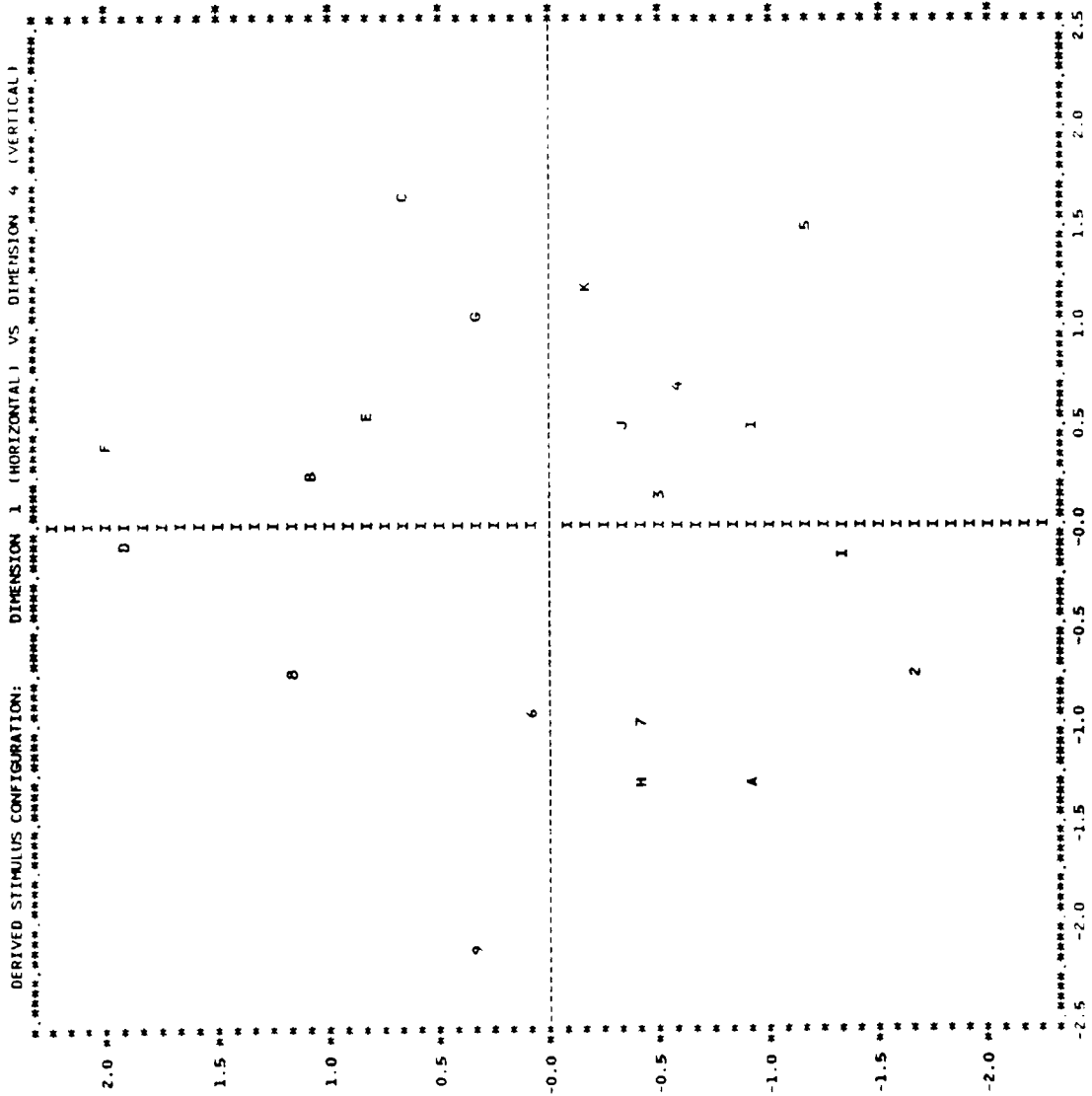




INDSCAL SUBSET D

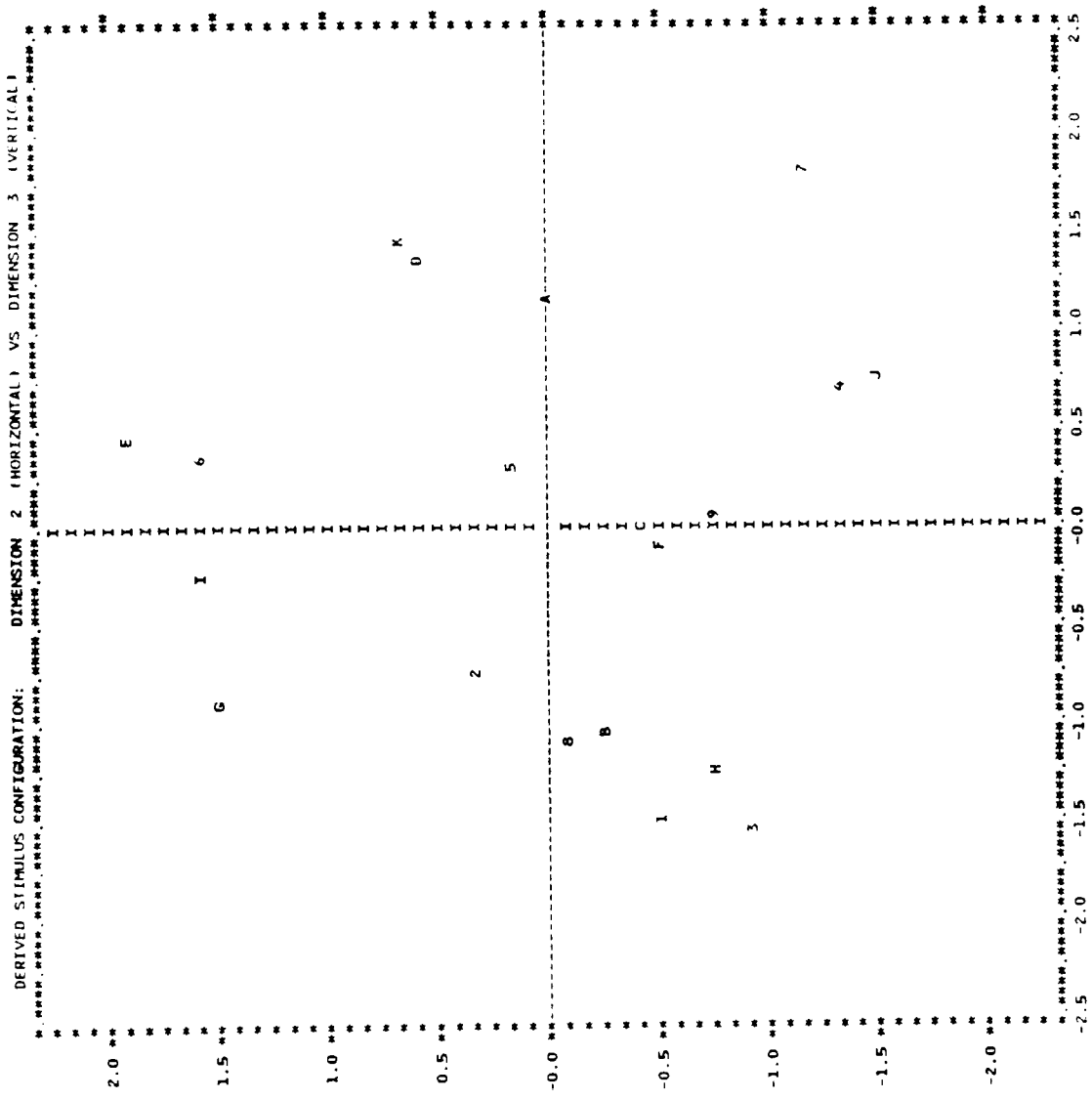
1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor





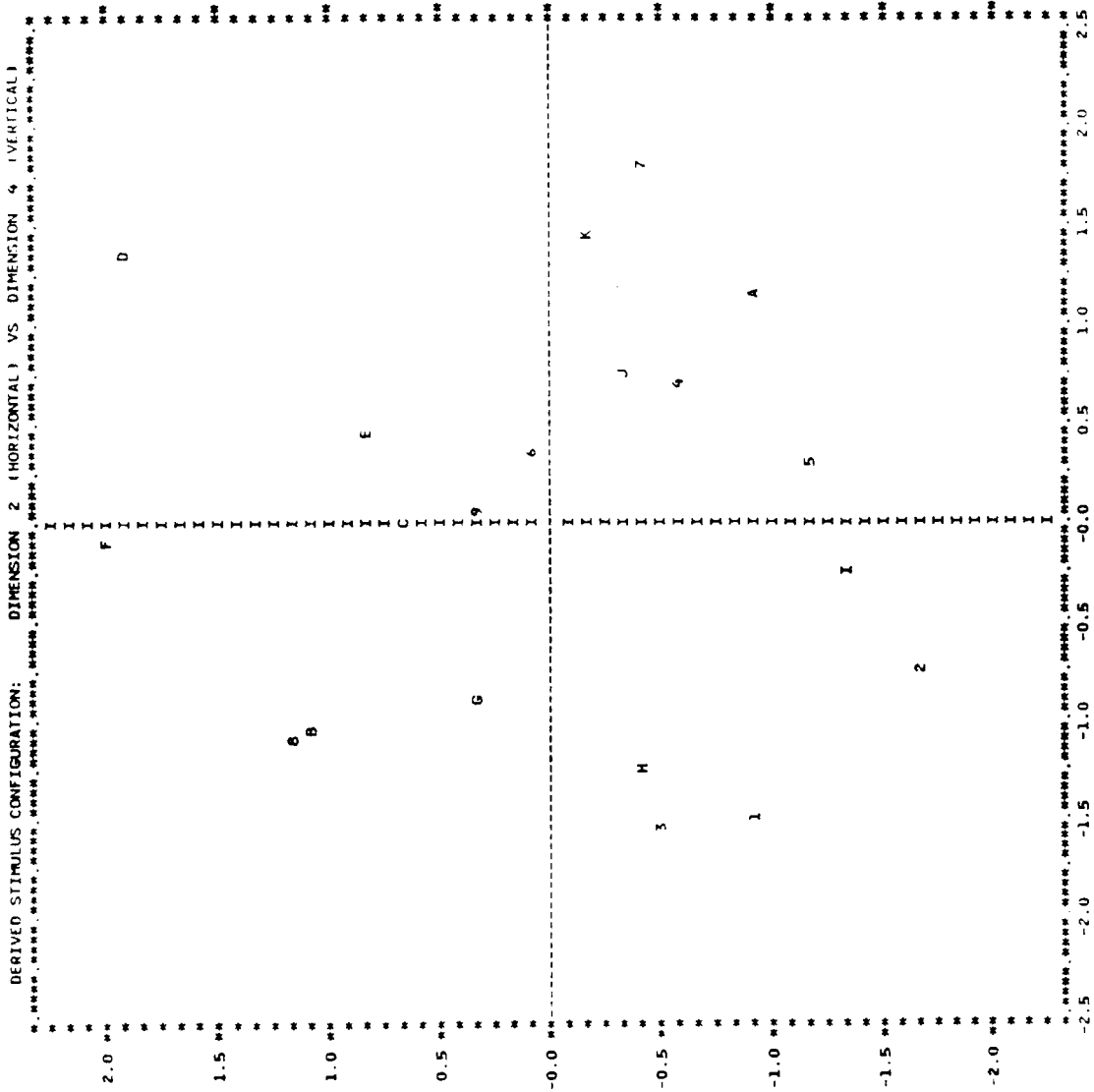
INDSCAL SUBSET D

1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor



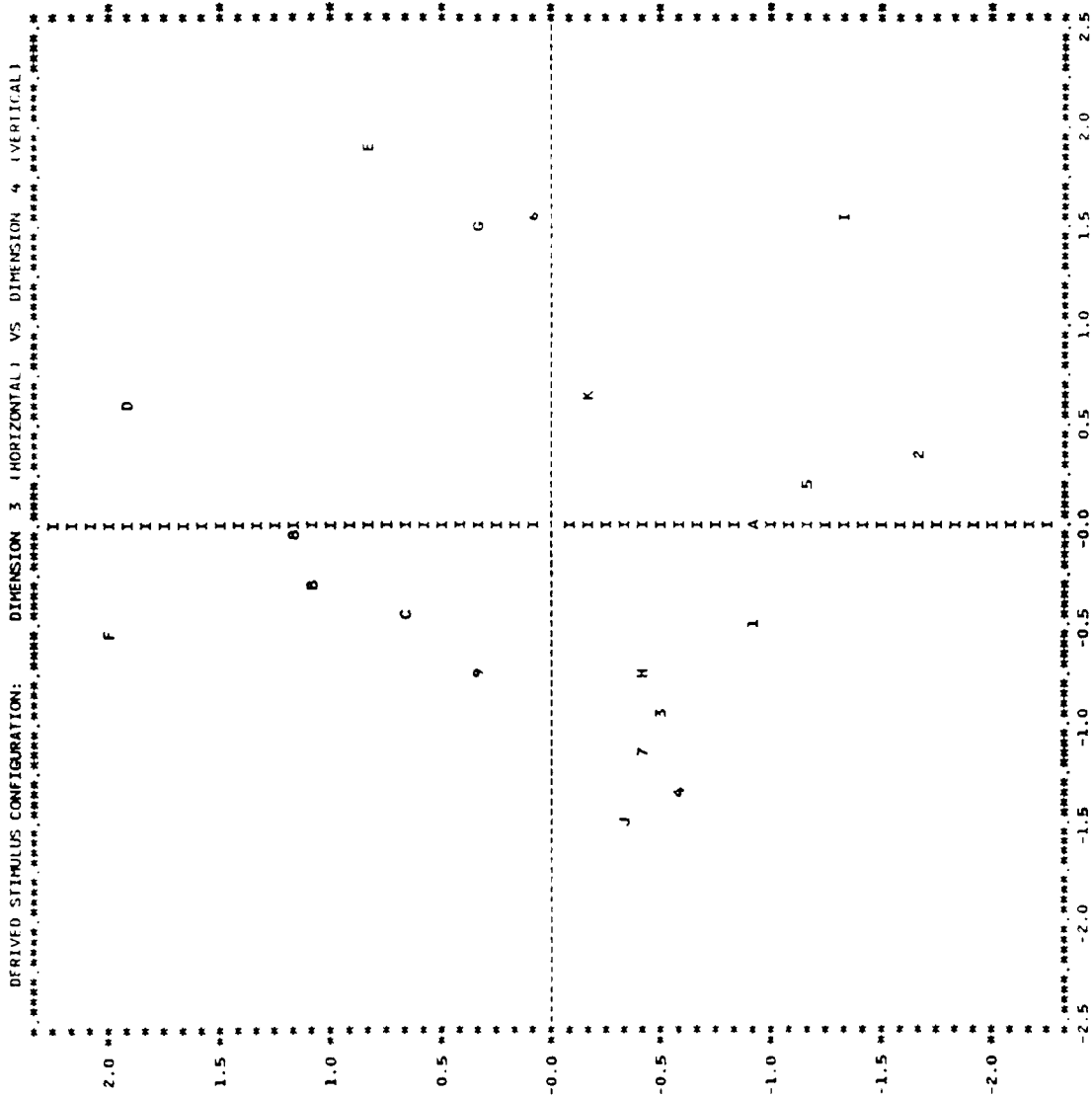
INDSCAL SUBSET D

1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Firmn.
- J. Flight Attendant
- K. Janitor



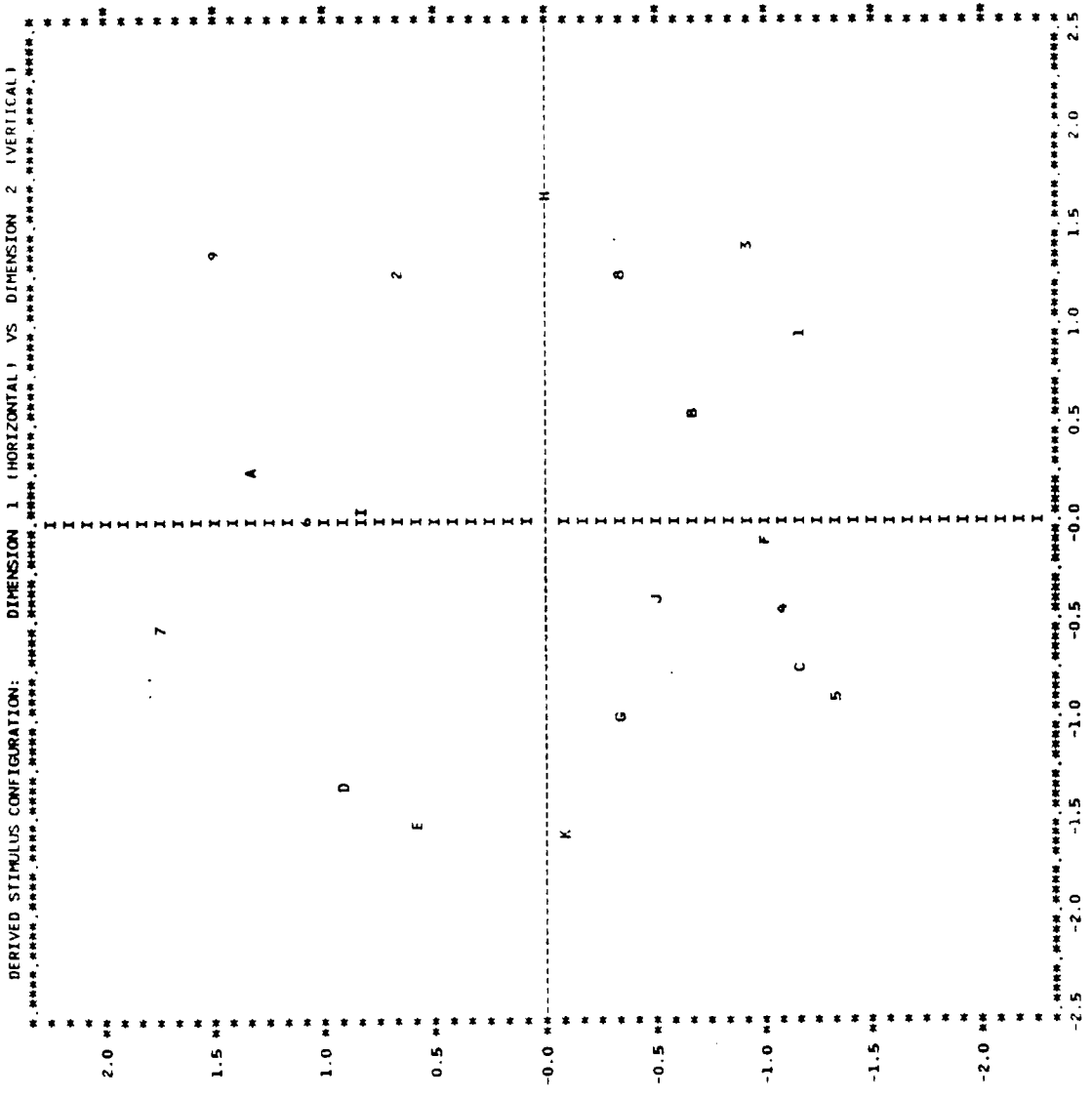
INDSCAL SUBSET D

1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
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INDSCAL SUBSET D

1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
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- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor

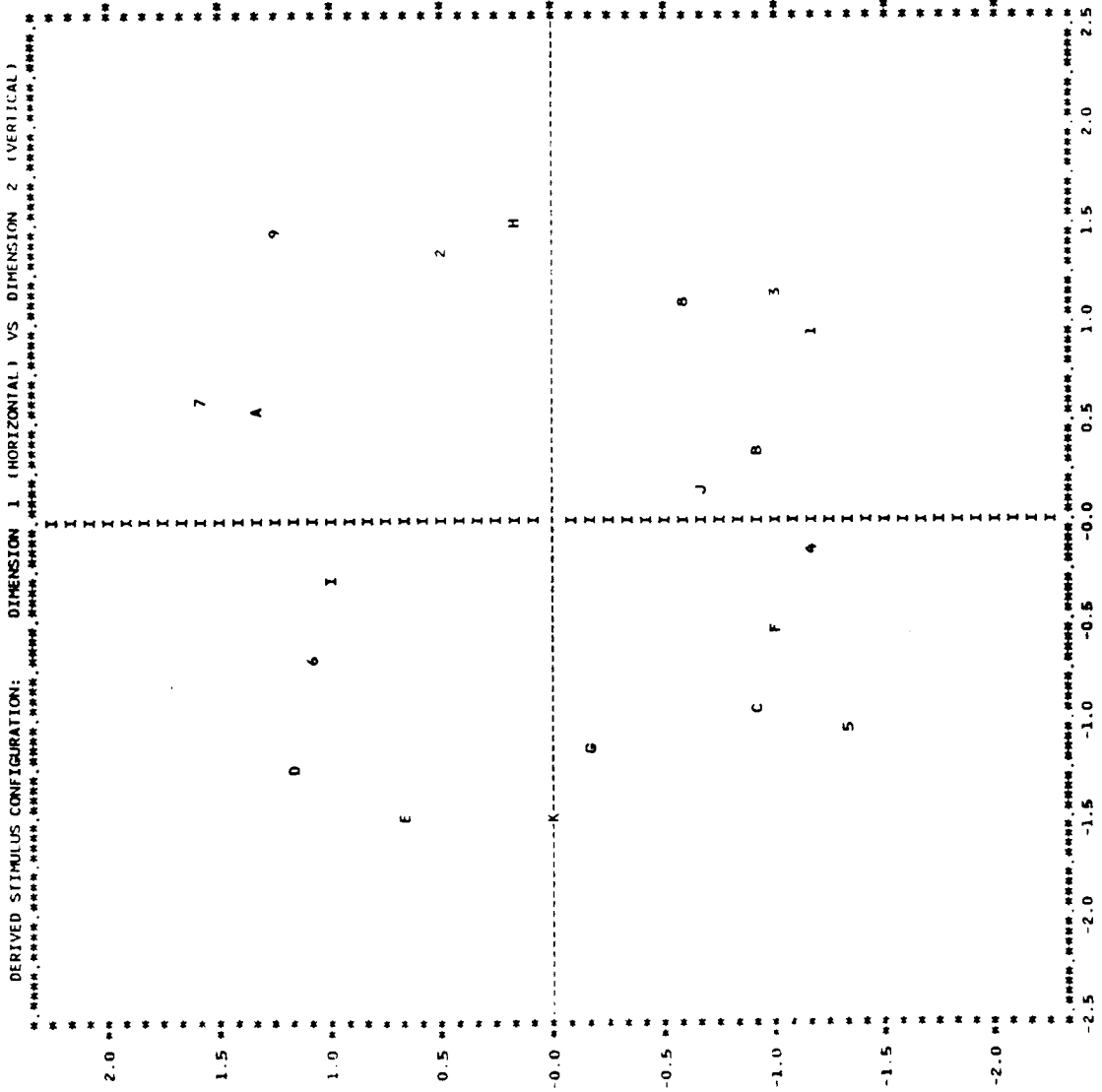


ALSCAL SUBSET A

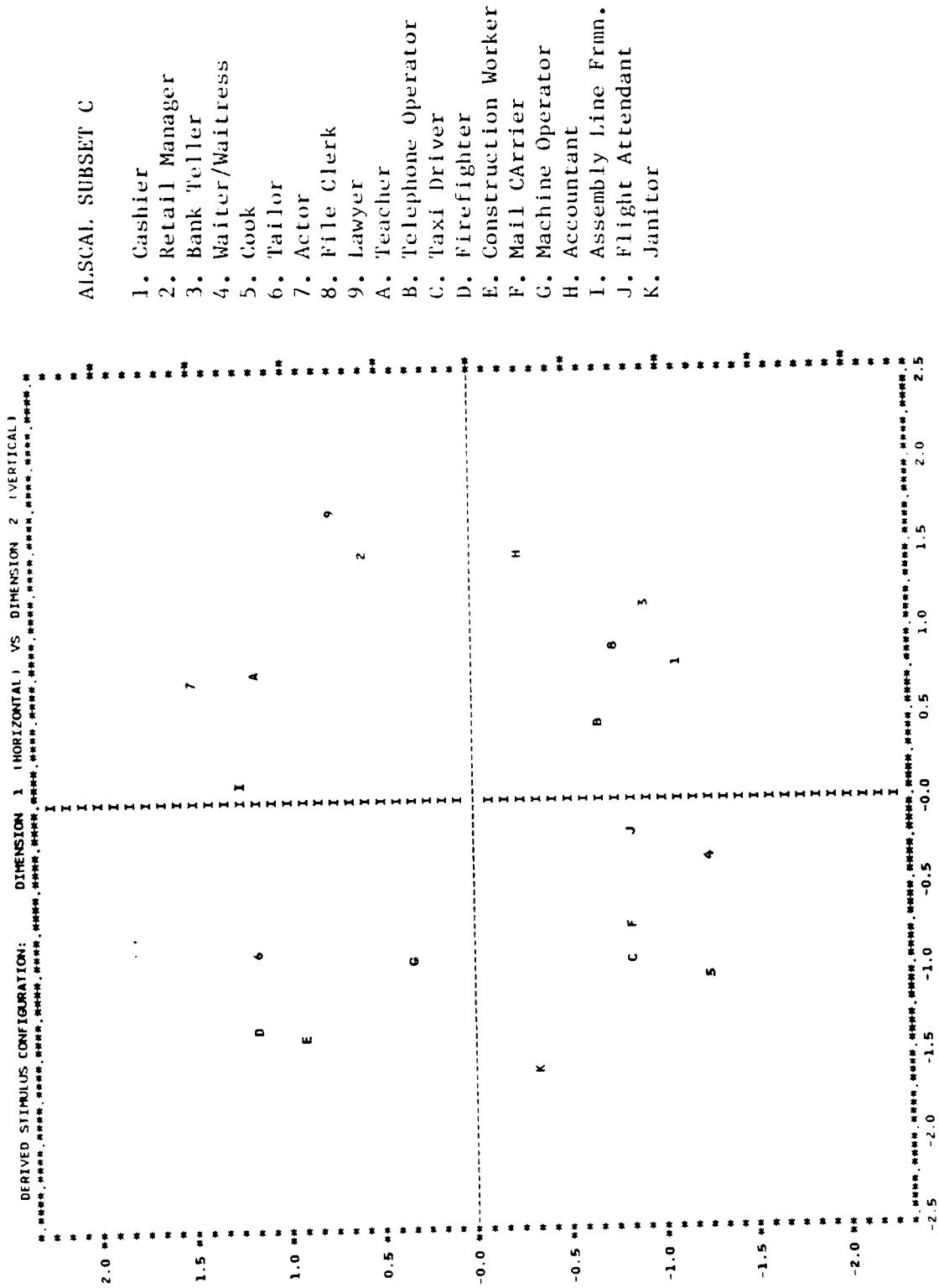
1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor

ALSCAL SUBSET B

1. Cashier
2. Retail Manager
3. Bank Teller
4. Waiter/Waitress
5. Cook
6. Tailor
7. Actor
8. File Clerk
9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor

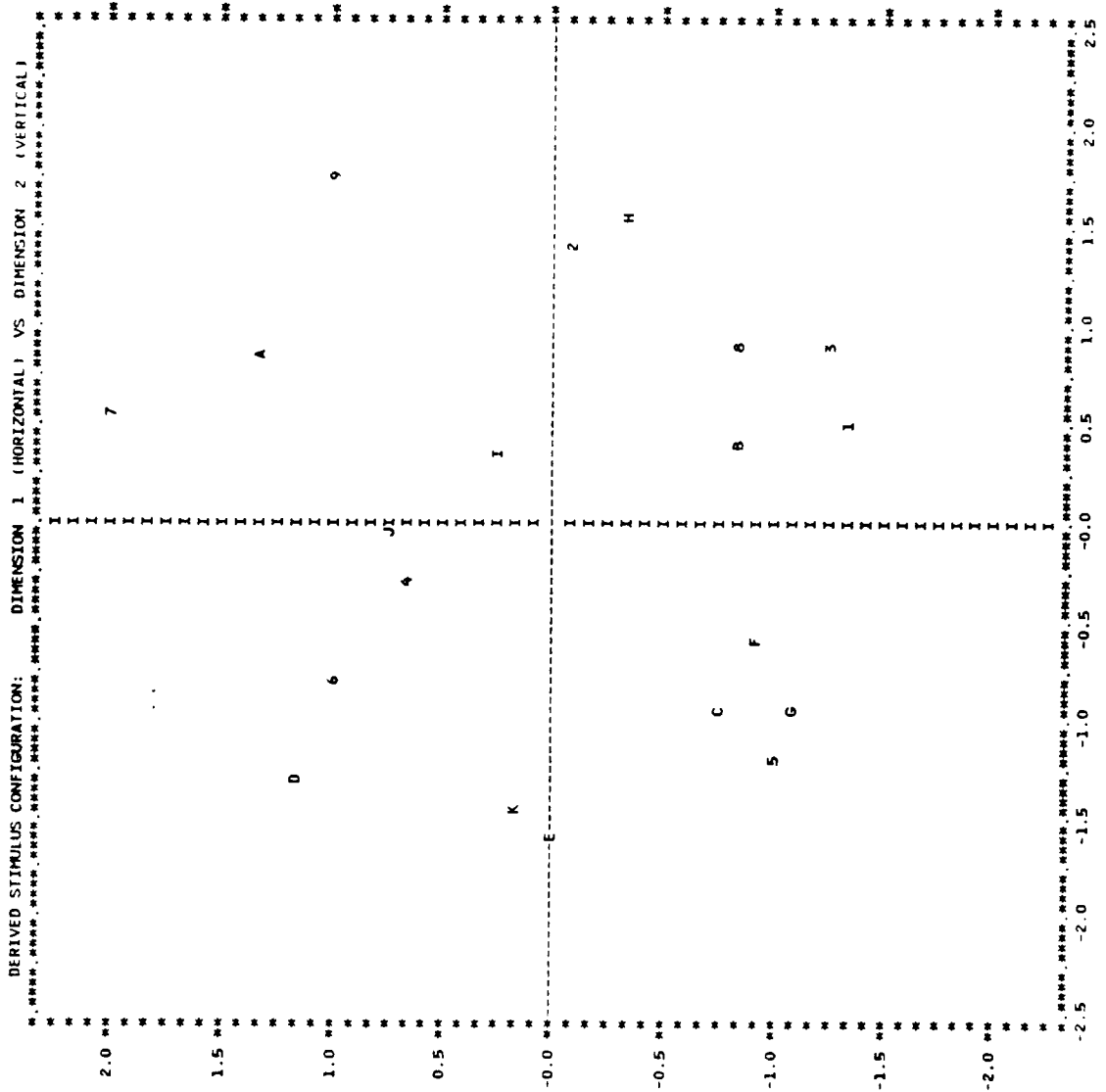


ALSCAL. SUBSET C



ALSCAL, SUBSET D

- 1. Cashier
- 2. Retail Manager
- 3. Bank Teller
- 4. Waiter/Waitress
- 5. Cook
- 6. Tailor
- 7. Actor
- 8. File Clerk
- 9. Lawyer
- A. Teacher
- B. Telephone Operator
- C. Taxi Driver
- D. Firefighter
- E. Construction Worker
- F. Mail Carrier
- G. Machine Operator
- H. Accountant
- I. Assembly Line Frmn.
- J. Flight Attendant
- K. Janitor



APPENDIX I

SUBJECT WEIGHTS MEASURING THE IMPORTANCE OF EACH DIMENSION

SUBJECT WEIGHTS

SUBJECT NUMBER	PLOT SYMBOL	WEIRD- NESS	DIMENSION			
			1	2	3	4
1	1	0.1877	0.3716	0.2503	0.4464	0.3282
2	2	0.1767	0.4793	0.3403	0.5799	0.4091
3	3	0.2084	0.5110	0.2687	0.4130	0.2814
4	4	0.1988	0.4216	0.3176	0.5415	0.4732
5	5	0.0650	0.3590	0.2926	0.3526	0.3014
6	6	0.2590	0.3282	0.6232	0.3559	0.4444
7	7	0.1156	0.4973	0.4876	0.4996	0.3229
8	8	0.0632	0.4052	0.3391	0.3866	0.3656
9	9	0.0665	0.4579	0.5095	0.4763	0.4559
10	A	0.1127	0.3443	0.4140	0.4482	0.3675
11	B	0.0891	0.5161	0.3954	0.4328	0.3394
12	C	0.0684	0.4040	0.3602	0.4138	0.3860
13	D	0.1459	0.3981	0.5373	0.3883	0.3620
14	E	0.0911	0.3813	0.3442	0.4297	0.3709
15	F	0.1014	0.3868	0.3792	0.4717	0.3519
16	G	0.1770	0.4817	0.3720	0.5530	0.3110
17	H	0.1963	0.5765	0.2922	0.4108	0.3851
18	I	0.2055	0.5252	0.3363	0.3041	0.2665
19	J	0.0706	0.5075	0.5353	0.4345	0.4282
20	K	0.1228	0.3102	0.3693	0.3409	0.3725
21	L	0.1476	0.3666	0.4057	0.4518	0.4713
22	M	0.1321	0.3653	0.4232	0.3624	0.4345
23	N	0.1662	0.5047	0.3095	0.3410	0.2929
24	O	0.0913	0.4850	0.4662	0.3884	0.4581
25	P	0.3411	0.6803	0.4484	0.2086	0.3212
26	Q	0.2145	0.3622	0.5614	0.3255	0.4117
27	R	0.0993	0.4240	0.3477	0.4616	0.3853
28	S	0.0415	0.4560	0.4028	0.3859	0.3866
29	T	0.1764	0.4733	0.3667	0.5372	0.2996
30	U	0.3011	0.6885	0.2493	0.3911	0.3971
31	V	0.1761	0.4577	0.5165	0.5772	0.3126
32	W	0.2338	0.4153	0.5937	0.3045	0.4719
33	X	0.0495	0.3516	0.2853	0.2977	0.2790
34	Y	0.0736	0.4036	0.4459	0.4110	0.3295
35	Z	0.3258	0.5980	0.2989	0.5917	0.2267
36	1	0.1555	0.4197	0.5226	0.3548	0.4594
37	2	0.3107	0.6402	0.2707	0.3869	0.2572
38	3	0.1628	0.5400	0.5247	0.4082	0.2997
39	4	0.1299	0.4600	0.4352	0.5916	0.4228
40	5	0.1838	0.2539	0.4160	0.3183	0.2962
41	6	0.1551	0.4747	0.2897	0.4534	0.3742
42	7	0.3024	0.2757	0.4437	0.4521	0.6104
43	8	0.0401	0.4248	0.3873	0.4219	0.3831
44	9	0.0747	0.4312	0.4022	0.4753	0.4150

45	A	0.1782	0.5352	0.5772	0.4462	0.3006
46	B	0.1602	0.4102	0.5874	0.4174	0.3989
47	C	0.0554	0.4109	0.4046	0.4315	0.3991
48	D	0.1958	0.3821	0.5872	0.3810	0.4684
49	E	0.1477	0.4894	0.3184	0.3152	0.3368
50	F	0.1401	0.2927	0.3600	0.4093	0.3533
51	G	0.0771	0.4600	0.4883	0.4449	0.3488
52	H	0.1709	0.2972	0.4013	0.4707	0.3652
53	I	0.2180	0.2888	0.4214	0.5397	0.3999
54	J	0.1429	0.5488	0.3921	0.3458	0.3472
55	K	0.1286	0.3283	0.2467	0.3548	0.2483
56	L	0.0477	0.3732	0.3967	0.3908	0.3436
57	M	0.2458	0.3585	0.6090	0.3297	0.4012
58	N	0.0568	0.3753	0.2984	0.3115	0.2834
59	O	0.2372	0.6464	0.3264	0.3497	0.3845
60	P	0.1741	0.4547	0.3610	0.3920	0.5120
61	Q	0.1320	0.3544	0.3958	0.4744	0.3222
62	R	0.1376	0.5456	0.3360	0.4224	0.4036
63	S	0.1363	0.4267	0.5433	0.3785	0.3980
64	T	0.2200	0.3447	0.5278	0.3917	0.5326
65	U	0.3848	0.3123	0.6753	0.3703	0.2164
66	V	0.1362	0.6053	0.5053	0.3759	0.4131
67	W	0.1234	0.4015	0.3146	0.4495	0.3712
68	X	0.0835	0.4047	0.3487	0.4109	0.3943
69	Y	0.1412	0.4224	0.4791	0.3949	0.2800
70	Z	0.2301	0.3742	0.5006	0.3934	0.2200
71	1	0.1769	0.5584	0.3769	0.5852	0.3514
72	2	0.2601	0.5396	0.2482	0.4987	0.2946
73	3	0.2185	0.4838	0.2596	0.4391	0.4699
74	4	0.2610	0.6445	0.4116	0.3239	0.2795
75	5	0.1907	0.3656	0.5001	0.5222	0.3039
76	6	0.2161	0.5706	0.3570	0.5147	0.2733
77	7	0.1007	0.4381	0.4982	0.3744	0.4010
78	8	0.2347	0.5762	0.5555	0.2990	0.3249
79	9	0.1368	0.3263	0.3593	0.3972	0.4067
80	A	0.1203	0.3529	0.3113	0.4206	0.2903
81	B	0.1570	0.3999	0.4953	0.3376	0.3047
82	C	0.1755	0.3233	0.4089	0.5061	0.4253
83	D	0.2143	0.4764	0.4907	0.4694	0.2268
84	E	0.0793	0.3986	0.4036	0.3612	0.2855
85	F	0.0815	0.4393	0.3881	0.4683	0.3397
86	G	0.2275	0.3375	0.3997	0.6040	0.4714
87	H	0.1438	0.5641	0.3568	0.3831	0.3906
88	I	0.1077	0.4912	0.5724	0.4671	0.3828
89	J	0.0919	0.4846	0.4256	0.3690	0.3209
90	K	0.1834	0.4693	0.5790	0.4722	0.2965
91	L	0.0443	0.4252	0.4192	0.4147	0.4041
92	M	0.1108	0.2822	0.2479	0.3338	0.2495
93	N	0.1957	0.5362	0.6149	0.3551	0.3687
94	O	0.1838	0.3556	0.2277	0.4017	0.3210
95	P	0.2651	0.5085	0.3602	0.3348	0.5975
96	Q	0.1249	0.4486	0.5536	0.4182	0.3695
97	R	0.1506	0.4212	0.3164	0.4056	0.4451
98	S	0.0561	0.3602	0.3180	0.2846	0.2880
99	T	0.1028	0.2579	0.2907	0.3085	0.2901
100	U	0.1686	0.5113	0.4438	0.5328	0.2851
101	V	0.2529	0.6176	0.4376	0.3505	0.2478
102	W	0.2161	0.3484	0.6057	0.4131	0.3807
103	X	0.1977	0.3758	0.2730	0.4898	0.3351
104	Y	0.3390	0.3729	0.5947	0.2513	0.6050

105	Z	0.2039	0.5890	0.2993	0.4487	0.3460
106	1	0.2073	0.5818	0.3080	0.4768	0.3218
107	2	0.0807	0.4050	0.4656	0.4481	0.4222
108	3	0.1605	0.4391	0.2964	0.4214	0.4358
109	4	0.0604	0.4335	0.4025	0.3486	0.3688
110	5	0.1951	0.5125	0.2747	0.3451	0.3001
111	6	0.2411	0.5718	0.3645	0.5343	0.2503
112	7	0.1339	0.5787	0.4204	0.3681	0.3875
113	8	0.3165	0.3665	0.2782	0.3769	0.5817
114	9	0.0958	0.5382	0.4335	0.3994	0.3506
115	A	0.0808	0.3089	0.3327	0.3614	0.2780
116	B	0.0562	0.4701	0.3824	0.4262	0.3483
117	C	0.3582	0.5287	0.6520	0.1752	0.3788
118	D	0.2185	0.4663	0.5594	0.2830	0.4564
119	E	0.1593	0.5862	0.3428	0.4151	0.3868
120	F	0.1195	0.3496	0.4428	0.3372	0.3587
121	G	0.1547	0.6023	0.3570	0.4261	0.4156
122	H	0.1405	0.3608	0.2292	0.3196	0.3056
123	I	0.1425	0.5652	0.3426	0.4566	0.3872
124	J	0.1356	0.3992	0.2774	0.3680	0.2495
125	K	0.2010	0.3523	0.5290	0.6186	0.4441
126	L	0.1213	0.4789	0.3617	0.4400	0.4670
127	M	0.0831	0.2960	0.3097	0.3518	0.2766
128	N	0.0870	0.4610	0.3760	0.3650	0.2998
129	O	0.0255	0.3989	0.3799	0.3657	0.3162
130	P	0.1373	0.3541	0.4075	0.4574	0.2932
131	Q	0.1547	0.3186	0.4571	0.3868	0.2984
132	R	0.2276	0.5291	0.2990	0.5036	0.2773
133	S	0.1917	0.3465	0.3544	0.3822	0.4788
134	T	0.1200	0.4960	0.3520	0.3425	0.3257
135	U	0.0510	0.4845	0.4152	0.4355	0.4305
136	V	0.2446	0.3334	0.5552	0.4098	0.2663
137	W	0.0966	0.5174	0.3965	0.3884	0.3377
138	X	0.0863	0.3880	0.4155	0.4643	0.3573
139	Y	0.1075	0.4323	0.4108	0.3866	0.4574
140	Z	0.2610	0.3875	0.5695	0.2932	0.2876
141	1	0.1110	0.3828	0.4950	0.4375	0.3684
142	2	0.1135	0.4015	0.3824	0.4870	0.3348
143	3	0.2186	0.3757	0.3724	0.4863	0.5536
144	4	0.0404	0.3834	0.3896	0.3571	0.3488
145	5	0.2484	0.3779	0.3848	0.5611	0.2477
146	6	0.0318	0.5046	0.4971	0.4647	0.4508
147	7	0.1422	0.4758	0.3207	0.4885	0.3614
148	8	0.1812	0.5162	0.5894	0.3677	0.3470
149	9	0.1996	0.5228	0.5661	0.3238	0.3420
150	A	0.0577	0.4518	0.3902	0.4014	0.3191
151	B	0.0765	0.4376	0.4713	0.3571	0.3996
152	C	0.2754	0.2588	0.6000	0.4904	0.5128
153	D	0.1800	0.5712	0.4107	0.4094	0.2769
154	E	0.3631	0.6762	0.2393	0.3584	0.2570
155	F	0.1291	0.2992	0.3059	0.3232	0.3573
156	G	0.1780	0.4150	0.5448	0.3840	0.3032
157	H	0.1437	0.4561	0.3961	0.4056	0.5055
158	I	0.1367	0.4816	0.5139	0.4974	0.3110
159	J	0.2918	0.3299	0.4534	0.4285	0.6457
160	K	0.2590	0.5080	0.4211	0.2960	0.5854
161	L	0.1396	0.4949	0.5997	0.4149	0.3981
162	M	0.0529	0.4468	0.4671	0.4020	0.3842
163	N	0.2357	0.5953	0.3034	0.3828	0.2915
164	O	0.0529	0.5143	0.4123	0.4510	0.4163

165	P	0.1144	0.4298	0.5505	0.4324	0.4280
166	Q	0.2459	0.6507	0.4423	0.3294	0.2984
167	R	0.1341	0.5775	0.4012	0.3877	0.3621
168	S	0.2454	0.5374	0.3215	0.3046	0.5022
169	T	0.2875	0.4582	0.6791	0.3496	0.2962
170	U	0.0880	0.3812	0.3698	0.3931	0.4037
171	V	0.1004	0.3530	0.3728	0.4406	0.3378
172	W	0.0903	0.5112	0.4085	0.3688	0.4003
173	X	0.1944	0.5746	0.3033	0.4423	0.3381
174	Y	0.1522	0.3955	0.5840	0.4623	0.4411
175	Z	0.1702	0.6052	0.3656	0.3896	0.3661
176	1	0.0766	0.4432	0.5118	0.4353	0.4025
177	2	0.1019	0.4742	0.3354	0.4374	0.3832
178	3	0.2082	0.3014	0.5008	0.4514	0.4814
179	4	0.0619	0.4507	0.3833	0.4405	0.3387
180	5	0.2993	0.3492	0.4169	0.3862	0.6386
181	6	0.1168	0.5406	0.3622	0.4225	0.4267
182	7	0.1205	0.5695	0.3728	0.4439	0.3884
183	8	0.1950	0.6392	0.3886	0.4265	0.3221
184	9	0.2486	0.4525	0.2164	0.3216	0.2174
185	A	0.0429	0.4421	0.3826	0.3908	0.3261
186	B	0.1276	0.5111	0.5031	0.3806	0.5019
187	C	0.1135	0.3180	0.3004	0.3943	0.2980
188	D	0.0352	0.4798	0.4065	0.4312	0.3728
189	E	0.2006	0.4111	0.6391	0.4341	0.3744
190	F	0.1219	0.4489	0.3378	0.4874	0.3774
191	G	0.0876	0.3520	0.3764	0.4024	0.2914
192	H	0.1255	0.3660	0.2625	0.3713	0.2651
193	I	0.0762	0.3607	0.3070	0.3761	0.3301
194	J	0.1334	0.5184	0.3270	0.4356	0.3525
195	K	0.2682	0.3358	0.4364	0.3108	0.5424
196	L	0.3327	0.6474	0.3015	0.4742	0.2066
197	M	0.3530	0.4135	0.6431	0.1977	0.5257
198	N	0.1529	0.4547	0.5353	0.3404	0.3722
199	O	0.0314	0.4928	0.4408	0.4221	0.3822
200	P	0.0864	0.4397	0.3521	0.3573	0.3907
201	Q	0.1343	0.4498	0.5753	0.4091	0.4547
202	R	0.1117	0.4535	0.3307	0.4590	0.3546
203	S	0.0907	0.4357	0.3622	0.4307	0.4226
204	T	0.1852	0.4471	0.5814	0.3404	0.3868
205	U	0.2108	0.3979	0.5904	0.3364	0.3874
206	V	0.1339	0.3900	0.4814	0.4761	0.4903
207	W	0.0565	0.5092	0.4100	0.4716	0.4199
208	X	0.2995	0.3187	0.6860	0.4499	0.3306
209	Y	0.1348	0.3822	0.3060	0.3948	0.4053
210	Z	0.2814	0.4269	0.4508	0.2897	0.5973
211	1	0.0390	0.4472	0.4385	0.4658	0.3886
212	2	0.1456	0.4934	0.4021	0.4923	0.2898
213	3	0.0468	0.3843	0.3842	0.3345	0.3152
214	4	0.2767	0.2937	0.5805	0.3645	0.2982
215	5	0.1348	0.4957	0.3278	0.4603	0.4320
216	6	0.0963	0.3716	0.3827	0.4543	0.3754
217	7	0.1569	0.3779	0.4266	0.5321	0.3351
218	8	0.1096	0.4281	0.3065	0.4023	0.3743
219	9	0.0412	0.4511	0.4517	0.4427	0.4254
220	A	0.0660	0.5168	0.4015	0.4189	0.3992
221	B	0.1875	0.3865	0.4935	0.3403	0.4886
222	C	0.2888	0.2965	0.5602	0.3494	0.5497
223	D	0.2552	0.2644	0.3052	0.4906	0.4132
224	E	0.1001	0.4143	0.4919	0.4283	0.4514

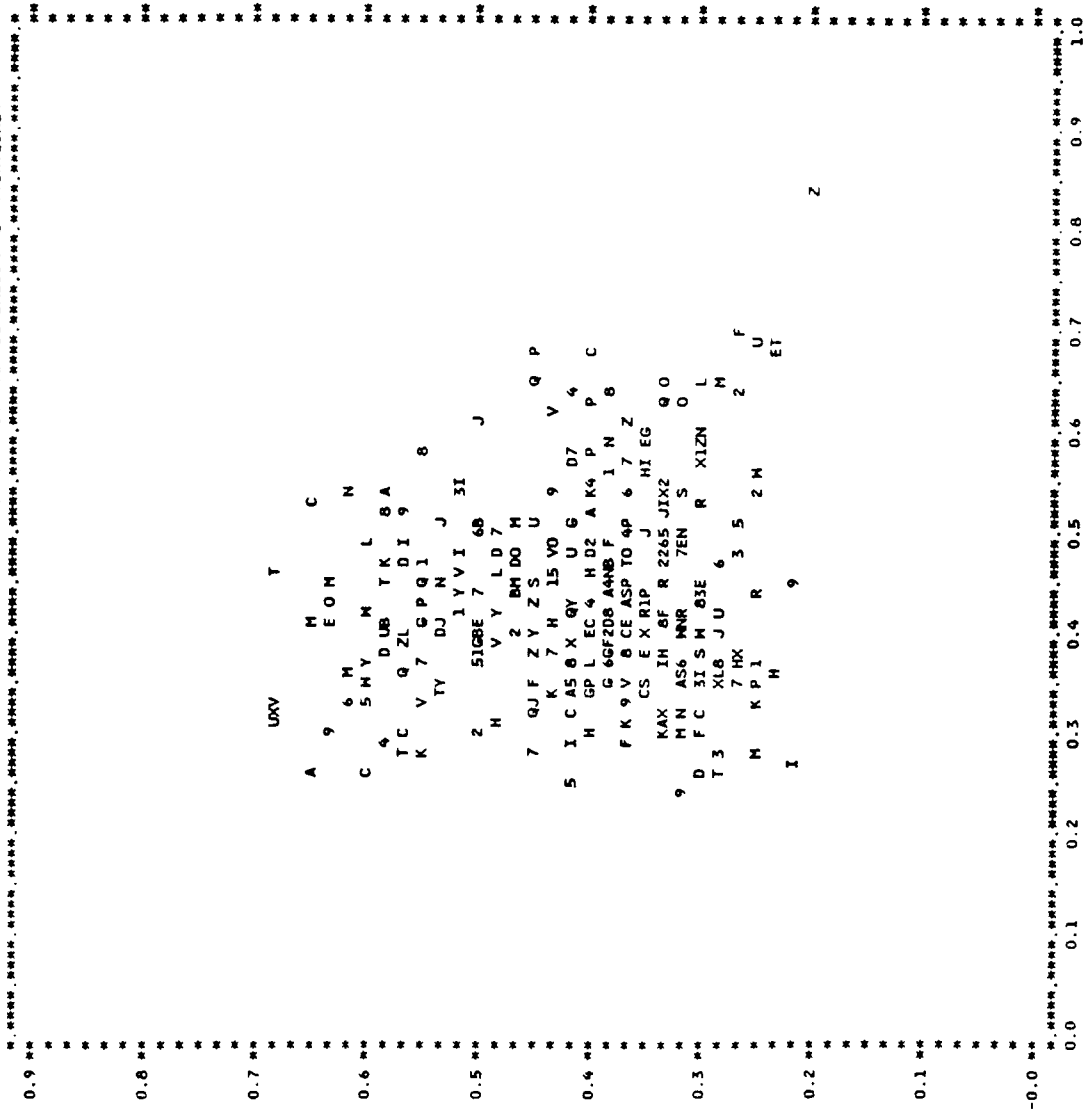
225	F	0.0740	0.4214	0.3339	0.3922	0.3040
226	G	0.1092	0.3869	0.4996	0.4325	0.4097
227	H	0.1471	0.3775	0.3405	0.4962	0.3661
228	I	0.1777	0.5459	0.5231	0.4287	0.2802
229	J	0.2484	0.6116	0.5059	0.3547	0.2549
230	K	0.3083	0.2806	0.5489	0.3941	0.6098
231	L	0.1960	0.3589	0.2843	0.4926	0.3342
232	M	0.3562	0.6510	0.2871	0.5758	0.2105
233	N	0.1079	0.4084	0.3236	0.4457	0.3514
234	O	0.2098	0.6303	0.3230	0.4143	0.3613
235	P	0.2032	0.6288	0.3999	0.4200	0.2963
236	Q	0.0707	0.4186	0.4173	0.3398	0.3605
237	R	0.2542	0.4402	0.2516	0.5083	0.2676
238	S	0.0568	0.4511	0.4483	0.4947	0.4171
239	T	0.4373	0.6939	0.2368	0.2571	0.2291
240	U	0.0911	0.4066	0.3715	0.4599	0.4001
241	V	0.0668	0.4845	0.4307	0.4745	0.3514
242	W	0.2199	0.4039	0.3022	0.3715	0.4991
243	X	0.1395	0.5351	0.3271	0.4168	0.3684
244	Y	0.0955	0.4354	0.5214	0.4327	0.3777
245	Z	0.5624	0.8398	0.1949	0.2616	0.1936
246	1	0.0982	0.4294	0.3421	0.4581	0.3656
247	2	0.1947	0.2959	0.5006	0.4648	0.4168
248	3	0.1231	0.2844	0.2796	0.3620	0.3034
249	4	0.1021	0.5042	0.3606	0.4654	0.4240
250	5	0.2397	0.3337	0.5993	0.4105	0.5319
251	6	0.1035	0.4868	0.3409	0.3733	0.3765
252	7	0.0973	0.3503	0.2627	0.2815	0.3024
253	8	0.1017	0.3797	0.3621	0.4109	0.2723
254	9	0.3152	0.3013	0.6251	0.3878	0.2694
255	A	0.0409	0.4317	0.3658	0.4089	0.3503
256	B	0.2341	0.4039	0.4972	0.3934	0.6128
257	C	0.2396	0.6815	0.4030	0.3590	0.3299
258	D	0.1247	0.4056	0.3837	0.5003	0.4391
259	E	0.1365	0.4125	0.3589	0.4712	0.2887
260	F	0.3643	0.7046	0.2678	0.3209	0.2776
261	G	0.0761	0.5094	0.4134	0.3908	0.3545
262	H	0.2046	0.3073	0.4894	0.5439	0.4017
263	I	0.1165	0.2697	0.2145	0.2683	0.2711
264	J	0.0981	0.4950	0.3476	0.4404	0.3788
265	K	0.1065	0.2978	0.3407	0.3822	0.3052
266	L	0.1968	0.4044	0.5723	0.4096	0.3036
267	M	0.1432	0.5053	0.4700	0.3471	0.4834
268	N	0.1530	0.5862	0.3876	0.4098	0.3329
269	O	0.1868	0.4282	0.6323	0.4971	0.3574
270	P	0.1255	0.3526	0.2559	0.2599	0.3074
271	Q	0.2442	0.6291	0.3331	0.5061	0.2859
272	R	0.0725	0.4612	0.4807	0.5145	0.3886
273	S	0.1107	0.3834	0.2976	0.4035	0.3559
274	T	0.2407	0.2800	0.5617	0.4223	0.4473
275	U	0.1103	0.4233	0.2849	0.3389	0.2954
276	V	0.3356	0.3305	0.6839	0.3072	0.3467
277	W	0.2448	0.5566	0.2464	0.3500	0.3307
278	X	0.0885	0.3166	0.3306	0.3793	0.2871
279	Y	0.1565	0.3542	0.5315	0.4759	0.3945
280	Z	0.1598	0.3771	0.4420	0.5416	0.3441
281	1	0.1717	0.4739	0.5462	0.3202	0.3996
282	2	0.1475	0.5470	0.3264	0.4407	0.3718
283	3	0.0652	0.3478	0.3048	0.3519	0.2650
284	4	0.1359	0.5546	0.4002	0.4139	0.3151

285	5	0.0939	0.4632	0.4339	0.4330	0.3045
286	6	0.0865	0.3652	0.3183	0.4036	0.3335
287	7	0.2090	0.3674	0.5429	0.3542	0.4955
288	8	0.1070	0.3670	0.4121	0.4395	0.4193
289	9	0.2270	0.2386	0.3214	0.4293	0.3773
290	A	0.3094	0.2594	0.6574	0.4242	0.3844
291	B	0.0434	0.3713	0.3253	0.3587	0.3288
292	C	0.1428	0.3370	0.3498	0.3898	0.4197
293	D	0.0828	0.4738	0.4621	0.5481	0.4134
294	E	0.1337	0.4504	0.2953	0.4211	0.3170
295	F	0.1187	0.4876	0.3834	0.4466	0.2967
296	G	0.1263	0.3786	0.3859	0.4536	0.2852
297	H	0.1596	0.4137	0.4397	0.5752	0.5137
298	I	0.1113	0.3746	0.3354	0.4494	0.3457
299	J	0.1114	0.4138	0.5262	0.4632	0.3751
300	K	0.1402	0.5374	0.4055	0.3341	0.3466
301	L	0.1049	0.4626	0.4871	0.3908	0.4690
302	M	0.2009	0.4514	0.6283	0.4736	0.3193
303	N	0.1605	0.3241	0.3133	0.4547	0.3455
304	O	0.1018	0.4812	0.3688	0.3849	0.4290
305	P	0.1118	0.5787	0.3980	0.4298	0.4401

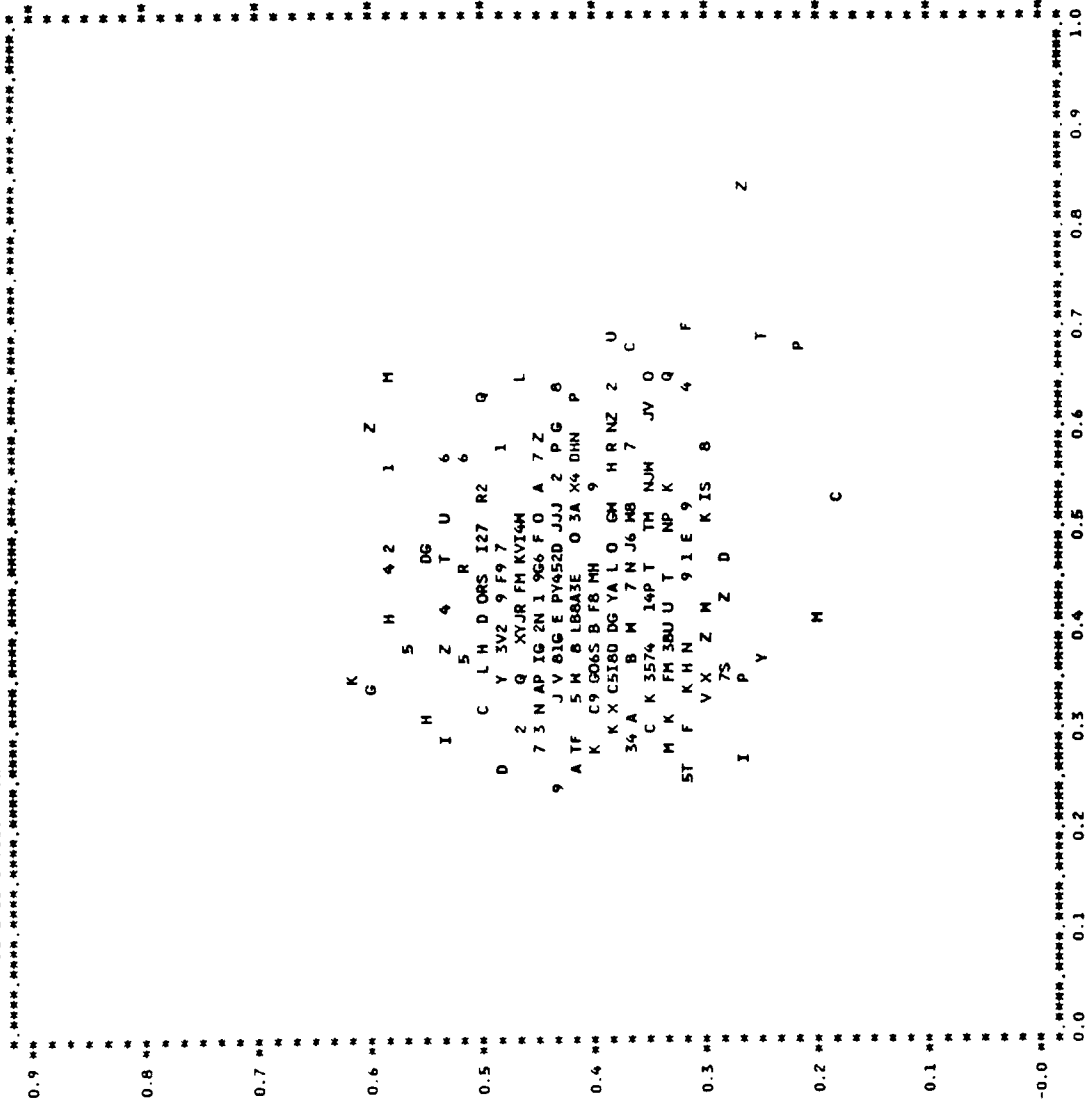
OVERALL IMPORTANCE OF EACH DIMENSION 0.2051 0.1812 0.1742 0.1431

APPENDIX J
PLOTS OF INDIVIDUAL SUBJECT WEIGHTS
FOUR-DIMENSIONAL INDSCAL SOLUTION

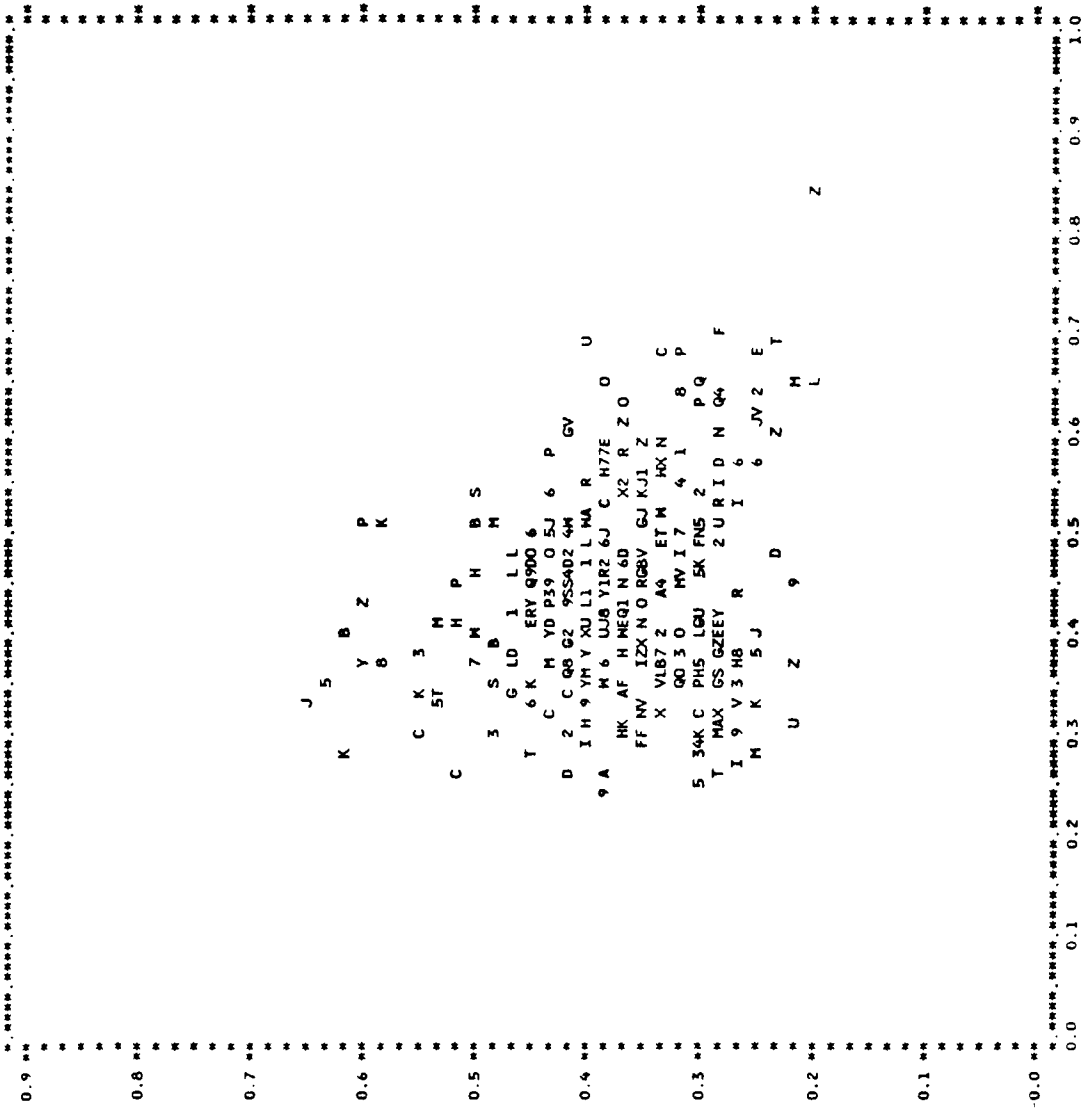
DERIVED SUBJECT HEIGHTS: DIMENSION 1 (HORIZONTAL) VS DIMENSION 2 (VERTICAL)



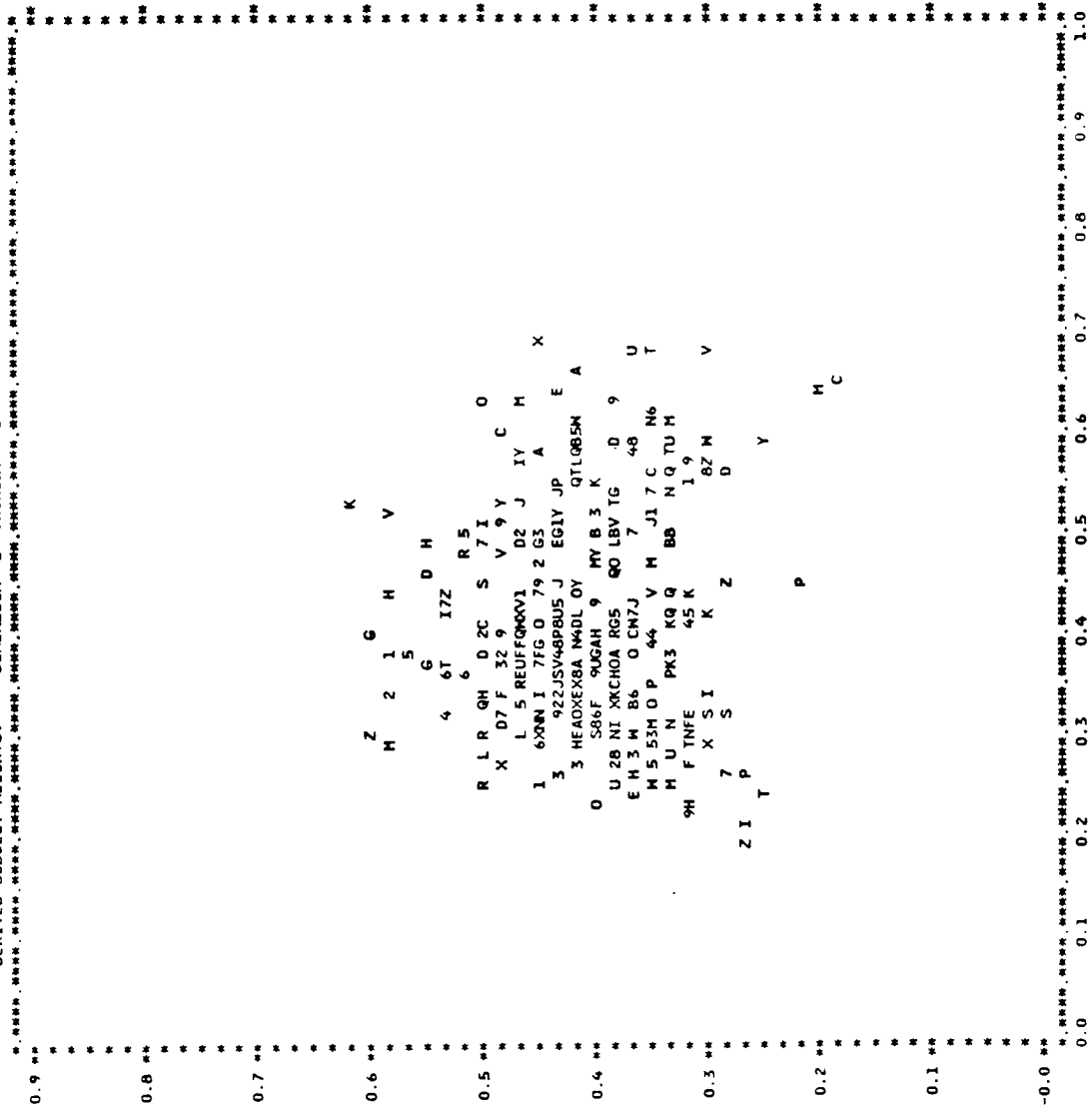
DERIVED SUBJECT WEIGHTS: DIMENSION 1 (HORIZONTAL) VS DIMENSION 3 (VERTICAL)



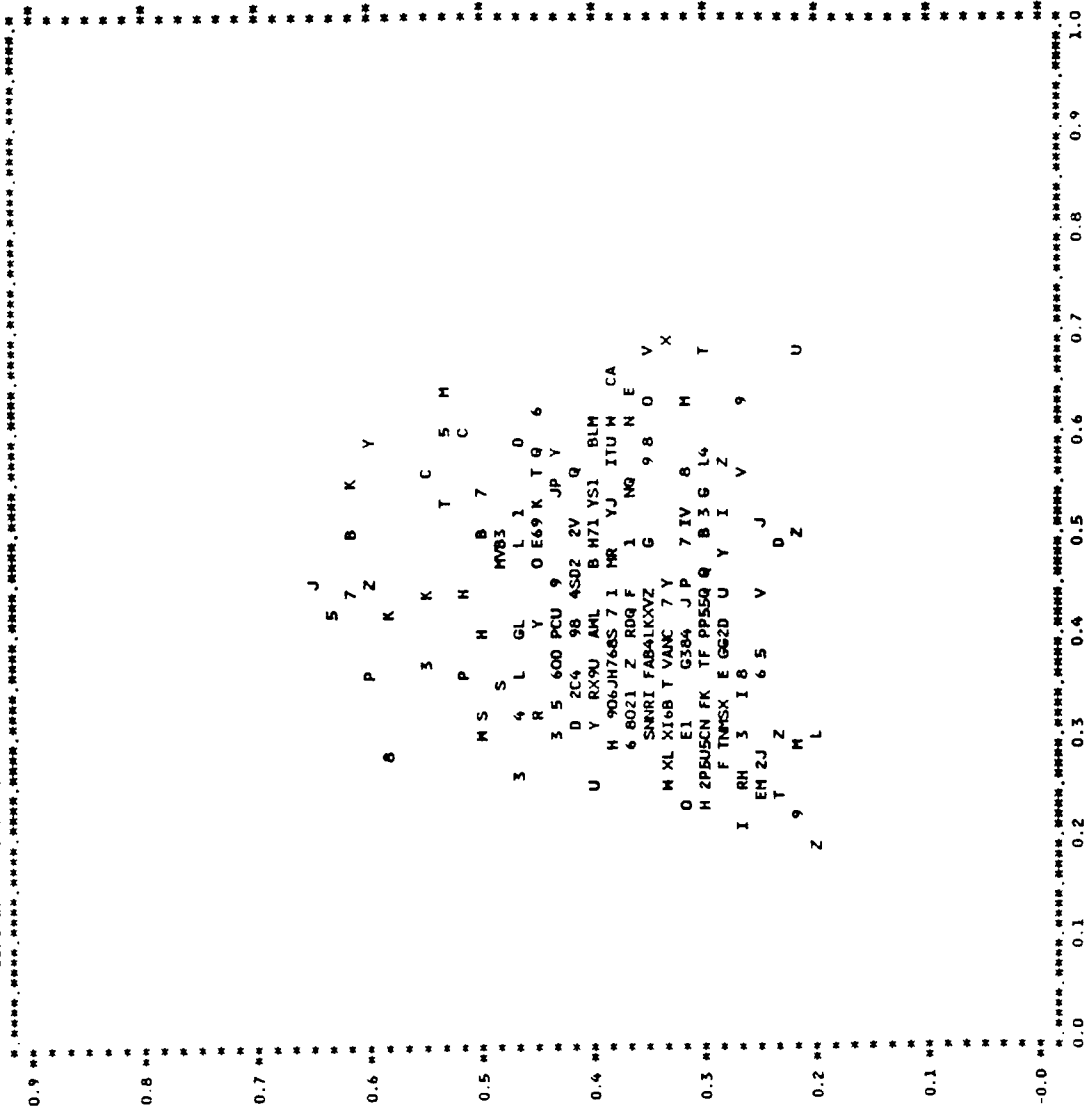
DERIVED SUBJECT WEIGHTS: DIMENSION 1 (HORIZONTAL) VS DIMENSION 4 (VERTICAL)



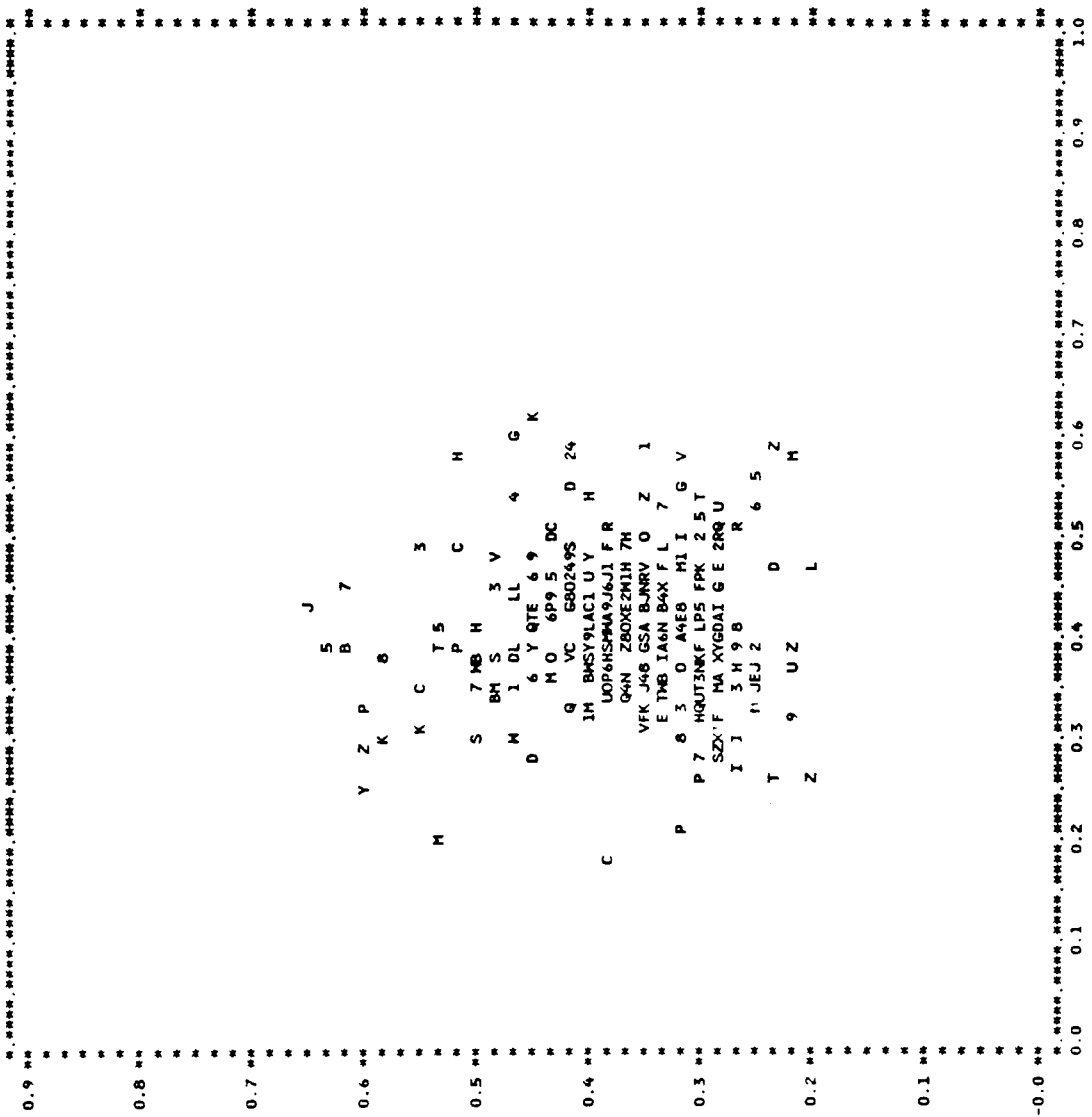
DERIVED SUBJECT HEIGHTS: DIMENSION 2 (HORIZONTAL) VS DIMENSION 3 (VERTICAL)



DERIVED SUBJECT WEIGHTS: DIMENSION 2 (HORIZONTAL) VS DIMENSION 4 (VERTICAL)



DERIVED SUBJECT WEIGHTS: DIMENSION 3 (HORIZONTAL) VS DIMENSION 4 (VERTICAL)



APPENDIX K

CORRELATIONS FOR DEMOGRAPHIC VARIABLES

Appendix K

Correlations of Demographic Variables, REP, and Differential Accuracy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Held Job (1)	1.000							
Years Worked (2)	0.228**	1.000						
Been a Manager (3)	-0.061	0.321**	1.000					
Age (4)	0.100	0.261**	0.160**	1.000				
Sex (5)	-0.073	-0.050	0.151**	-0.114	1.000			
REP (6)	-0.014	-0.003	0.082	-0.053	-0.089	1.000		
Diff Accuracy (Perf.) (7)	-0.012	-0.099	0.093	-0.050	0.048	-0.027	1.000	
Diff Accuracy (Freq.) (8)	-0.045	-0.096	0.075	0.032	0.019	0.148**	0.059	0.196**

* p < .05

** p < .01

APPENDIX L

COMPUTER PROGRAM FOR DETERMINING ACCURACY SCORES

```

DATA ONE;
INPUT IDA 1-5 ID 6-9 TAPE1 10 RATEE1 11
F1 12 F2 13 F3 14 F4 15 F5 16 F6 17
F7 18 F8 19 F9 20 F10 21 F11 22 F12 23 P1 24 P2 25 P3 26 P4 27 P5 28
P6 29 P7 30 P8 31 GLOBAL1 32 ID2 33-41 TAPE2 42 RATEE2 43 F13 44 F14 45
F15 46 F16 47 F17 48 F18 49 F19 50 F20 51 F21 52 F22 53 F23 54 F24 55
P9 56 P10 57 P11 58 P12 59 P13 60 P14 61 P15 62 P16 63 GLOBAL2 64 #2
ID3 1-9 TAPE3 10 RATEE3 11 F25 12 F26 13 F27 14 F28 15 F29 16 F30 17
F31 18 F32 19 F33 20 F34 21 F35 22 F36 23 P17 24 P18 25 P19 26 P20 27
P21 28 P22 29 P23 30 P24 31 GLOBAL3 32 ID4 33-41 TAPE4 42 RATEE4 43
F37 44 F38 45 F39 46 F40 47 F41 48 F42 49 F43 50 F44 51 F45 52 F46 53
F47 54 F48 55 P25 56 P26 57 P27 58 P28 59 P29 60 P30 61 P31 62 P32 63
GLOBAL4 64;
t1=3.4; t2=3.4; t3=3.3; t4=2.9; t5=3.5; t6=3.3; t7=3.2; t8=3.2;
t9=4.6; t10=4.4; t11=4.3; t12=4.7; t13=4.0; t14=4.0; t15=4.2;
t16=4.5; t17=4.1; t18=4.0; t19=4.1; t20=3.9; t21=3.3; t22=3.4;
t23=3.3; t24=3.6; t25=2.4; t26=2.5; t27=2.0; t28=1.5; t29=2.2;
t30=2.3; t31=1.6; t32=1.7;
TF1=5.1; TF2=4.3; TF3=4.4; TF4=4.2; TF5=4.1; TF6=5.3; TF7=6.2;
TF8=4.4; TF9=5.8; TF10=4.4; TF11=3.9; TF12=4.4; TF13=5.7; TF14=5.9;
TF15=6.1; TF16=6.7; TF17=6.1; TF18=5.8; TF19=3.9; TF20=6.4; TF21=6.7;
TF22=3.1; TF23=5.4; TF24=6.4; TF25=5.6; TF26=4.0; TF27=6.1; TF28=6.1;
TF29=5.0; TF30=5.3; TF31=6.5; TF32=6.0; TF33=5.2; TF34=4.6; TF35=3.3;
TF36=5.6; TF37=4.3; TF38=2.0; TF39=3.4; TF40=4.1; TF41=3.3; TF42=4.1;
TF43=6.1; TF44=2.3; TF45=3.6; TF46=2.2; TF47=2.6; TF48=3.0;
If tape1= 0 then tape=1;
If tape1=1 then tape=2;
If ratee1=0 then r1=1;
If ratee1=1 then r1=2;
If ratee1=2 then r1=3;
If ratee1=3 then r1=4;
If ratee2=0 then r2=1;
If ratee2=1 then r2=2;
if ratee2=2 then r2=3;
If ratee2=3 then r2=4;
If ratee3=0 then r3=1;
if ratee3=1 then r3=2;
if ratee3=2 then r3=3;
if ratee3=3 then r3=4;
If ratee4=0 then r4=1;
If ratee4=1 then r4=2;
If ratee4=2 then r4=3;
If ratee4=3 then r4=4;
ARRAY A P1-P32 F1-F48;
do over A;
A = A + 1;
end;

```


ARRAY REVERSE

```
F3 F4 F5 F7 F8 F9 F12 F15 F16 F17 F19 F29 F21 F24
F27 F28 F29 F31 F32 F33 F36 F39 F40 F41 F43 F44 F45 F48
TF3 TF4 TF5 TF7 TF8 TF9 TF12 TF15 TF16 TF17 TF19 TF20 TF21 TF24
TF27 TF28 TF29 TF31 TF32 TF33 TF36 TF39 TF40 TF41 TF43 TF44 TF45 TF48;
DO OVER REVERSE;
REVERSE=8-REVERSE; END;
*PERFORMANCE RATING MODIFICATIONS HERE;
*FOLLOWING ARE MEANS (PERF RATINGS) FOR EACH RATEE;
PMRATEE1=MEAN(P1,P2,P3,P4,P5,P6,P7,P8);
PMRATEE2=MEAN(P9,P10,P11,P12,P13,P14,P15,P16);
PMRATEE3=MEAN(P17,P18,P19,P20,P21,P22,P23,P24);
PMRATEE4=MEAN(P25,P26,P27,P28,P29,P30,P31,P32);
*FOLLOWING ARE MEANS (PERF RATINGS) FOR EACH DIMENSION;
PMDIM1=MEAN(P1,P9,P17,P25);
PMDIM2=MEAN(P2,P10,P18,P26);
PMDIM3=MEAN(P3,P11,P19,P27);
PMDIM4=MEAN(P4,P12,P20,P28);
PMDIM5=MEAN(P5,P13,P21,P29);
PMDIM6=MEAN(P6,P14,P22,P30);
PMDIM7=MEAN(P7,P15,P23,P31);
PMDIM8=MEAN(P8,P16,P24,P32);
*TRUE SCORE (PERF) MODIFICATIONS HERE;
TMRATEE1=MEAN(T1,T2,T3,T4,T5,T6,T7,T8);
TMRATEE2=MEAN(T9,T10,T11,T12,T13,T14,T15,T16);
TMRATEE3=MEAN(T17,T18,T19,T20,T21,T22,T23,T24);
TMRATEE4=MEAN(T25,T26,T27,T28,T29,T30,T31,T32);
TMDIM1=MEAN(T1,T9,T17,T25);
TMDIM2=MEAN(T2,T10,T18,T26);
TMDIM3=MEAN(T3,T11,T19,T27);
TMDIM4=MEAN(T4,T12,T20,T28);
TMDIM5=MEAN(T5,T13,T21,T29);
TMDIM6=MEAN(T6,T14,T22,T30);
TMDIM7=MEAN(T7,T15,T23,T31);
TMDIM8=MEAN(T8,T16,T24,T32);
PMSOVERAL=MEAN(P1,P2,P3,P4,P5,P6,P7,P8,P9,P10,P11,P12,P13,P14,P15,P16,
P17,P18,P19,P20,P21,P22,P23,P24,P25,P26,P27,P28,P29,P30,P31,P32);
TMSOVERAL=MEAN(T1,T2,T3,T4,T5,T6,T7,T8,T9,T10,T11,T12,T13,T14,T15,T16,
T17,T18,T19,T20,T21,T22,T23,T24,T25,T26,T27,T28,T29,T30,T31,T32);
*NEXT COMPUTE P' AND T' FOR DIFFERENTIAL ACCURACY;
PPRIME1=(P1-PMRATEE1-PMDIM1+PMSOVERAL);
TPRIME1=(T1-TMRATEE1-TMDIM1+TMSOVERAL);
PPRIME2=(P2-PMRATEE1-PMDIM2+PMSOVERAL);
TPRIME2=(T2-TMRATEE1-TMDIM2+TMSOVERAL);
PPRIME3=(P3-PMRATEE1-PMDIM3+PMSOVERAL);
TPRIME3=(T3-TMRATEE1-TMDIM3+TMSOVERAL);
PPRIME4=(P4-PMRATEE1-PMDIM4+PMSOVERAL);
TPRIME4=(T4-TMRATEE1-TMDIM4+TMSOVERAL);
PPRIME5=(P5-PMRATEE1-PMDIM5+PMSOVERAL);
TPRIME5=(T5-TMRATEE1-TMDIM5+TMSOVERAL);
PPRIME6=(P6-PMRATEE1-PMDIM6+PMSOVERAL);
TPRIME6=(T6-TMRATEE1-TMDIM6+TMSOVERAL);
PPRIME7=(P7-PMRATEE1-PMDIM7+PMSOVERAL);
TPRIME7=(T7-TMRATEE1-TMDIM7+TMSOVERAL);
PPRIME8=(P8-PMRATEE1-PMDIM8+PMSOVERAL);
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TPRIME8=(T8-TMRATEE1-TMDIM8+TMOVERAL);
PPRIME9=(P9-PMRATEE2-PMDIM1+PMOVERAL);
TPRIME9=(T9-TMRATEE2-TMDIM1+TMOVERAL);
PPRIME10=(P10-PMRATEE2-PMDIM2+PMOVERAL);
TPRIME10=(T10-TMRATEE2-TMDIM2+TMOVERAL);
PPRIME11=(P11-PMRATEE2-PMDIM3+PMOVERAL);
TPRIME11=(T11-TMRATEE2-TMDIM3+TMOVERAL);
PPRIME12=(P12-PMRATEE2-PMDIM4+PMOVERAL);
TPRIME12=(T12-TMRATEE2-TMDIM4+TMOVERAL);
PPRIME13=(P13-PMRATEE2-PMDIM5+PMOVERAL);
TPRIME13=(T13-TMRATEE2-TMDIM5+TMOVERAL);
PPRIME14=(P14-PMRATEE2-PMDIM6+PMOVERAL);
TPRIME14=(T14-TMRATEE2-TMDIM6+TMOVERAL);
PPRIME15=(P15-PMRATEE2-PMDIM7+PMOVERAL);
TPRIME15=(T15-TMRATEE2-TMDIM7+TMOVERAL);
PPRIME16=(P16-PMRATEE2-PMDIM8+PMOVERAL);
TPRIME16=(T16-TMRATEE2-TMDIM8+TMOVERAL);
PPRIME17=(P17-PMRATEE3-PMDIM1+PMOVERAL);
TPRIME17=(T17-TMRATEE3-TMDIM1+TMOVERAL);
PPRIME18=(P18-PMRATEE3-PMDIM2+PMOVERAL);
TPRIME18=(T18-TMRATEE3-TMDIM2+TMOVERAL);
PPRIME19=(P19-PMRATEE3-PMDIM3+PMOVERAL);
TPRIME19=(T19-TMRATEE3-TMDIM3+TMOVERAL);
PPRIME20=(P20-PMRATEE3-PMDIM4+PMOVERAL);
TPRIME20=(T20-TMRATEE3-TMDIM4+TMOVERAL);
PPRIME21=(P21-PMRATEE3-PMDIM5+PMOVERAL);
TPRIME21=(T21-TMRATEE3-TMDIM5+TMOVERAL);
PPRIME22=(P22-PMRATEE3-PMDIM6+PMOVERAL);
TPRIME22=(T22-TMRATEE3-TMDIM6+TMOVERAL);
PPRIME23=(P23-PMRATEE3-PMDIM7+PMOVERAL);
TPRIME23=(T23-TMRATEE3-TMDIM7+TMOVERAL);
PPRIME24=(P24-PMRATEE3-PMDIM8+PMOVERAL);
TPRIME24=(T24-TMRATEE3-TMDIM8+TMOVERAL);
PPRIME25=(P25-PMRATEE4-PMDIM1+PMOVERAL);
TPRIME25=(T25-TMRATEE4-TMDIM1+TMOVERAL);
PPRIME26=(P26-PMRATEE4-PMDIM2+PMOVERAL);
TPRIME26=(T26-TMRATEE4-TMDIM2+TMOVERAL);
PPRIME27=(P27-PMRATEE4-PMDIM3+PMOVERAL);
TPRIME27=(T27-TMRATEE4-TMDIM3+TMOVERAL);
PPRIME28=(P28-PMRATEE4-PMDIM4+PMOVERAL);
TPRIME28=(T28-TMRATEE4-TMDIM4+TMOVERAL);
PPRIME29=(P29-PMRATEE4-PMDIM5+PMOVERAL);
TPRIME29=(T29-TMRATEE4-TMDIM5+TMOVERAL);
PPRIME30=(P30-PMRATEE4-PMDIM6+PMOVERAL);
TPRIME30=(T30-TMRATEE4-TMDIM6+TMOVERAL);
PPRIME31=(P31-PMRATEE4-PMDIM7+PMOVERAL);
TPRIME31=(T31-TMRATEE4-TMDIM7+TMOVERAL);
PPRIME32=(P32-PMRATEE4-PMDIM8+PMOVERAL);
TPRIME32=(T32-TMRATEE4-TMDIM8+TMOVERAL);
DIFF1=(PPRIME1-TPRIME1)**2;
DIFF2=(PPRIME2-TPRIME2)**2;
DIFF3=(PPRIME3-TPRIME3)**2;
DIFF4=(PPRIME4-TPRIME4)**2;
DIFF5=(PPRIME5-TPRIME5)**2;
DIFF6=(PPRIME6-TPRIME6)**2;

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DIFF7=(PPRIME7-TPRIME7)**2;
DIFF8=(PPRIME8-TPRIME8)**2;
DIFF9=(PPRIME9-TPRIME9)**2;
DIFF10=(PPRIME10-TPRIME10)**2;
DIFF11=(PPRIME11-TPRIME11)**2;
DIFF12=(PPRIME12-TPRIME12)**2;
DIFF13=(PPRIME13-TPRIME13)**2;
DIFF14=(PPRIME14-TPRIME14)**2;
DIFF15=(PPRIME15-TPRIME15)**2;
DIFF16=(PPRIME16-TPRIME16)**2;
DIFF17=(PPRIME17-TPRIME17)**2;
DIFF18=(PPRIME18-TPRIME18)**2;
DIFF19=(PPRIME19-TPRIME19)**2;
DIFF20=(PPRIME20-TPRIME20)**2;
DIFF21=(PPRIME21-TPRIME21)**2;
DIFF22=(PPRIME22-TPRIME22)**2;
DIFF23=(PPRIME23-TPRIME23)**2;
DIFF24=(PPRIME24-TPRIME24)**2;
DIFF25=(PPRIME25-TPRIME25)**2;
DIFF26=(PPRIME26-TPRIME26)**2;
DIFF27=(PPRIME27-TPRIME27)**2;
DIFF28=(PPRIME28-TPRIME28)**2;
DIFF29=(PPRIME29-TPRIME29)**2;
DIFF30=(PPRIME30-TPRIME30)**2;
DIFF31=(PPRIME31-TPRIME31)**2;
DIFF32=(PPRIME32-TPRIME32)**2;
DAPERF=(DIFF1+DIFF2+DIFF3+DIFF4+DIFF5+DIFF6+DIFF7+DIFF8+DIFF9+DIFF10+
DIFF11+DIFF12+DIFF13+DIFF14+DIFF15+DIFF16+DIFF17+DIFF18+DIFF19+DIFF20+
DIFF21+DIFF22+DIFF23+DIFF24+DIFF25+DIFF26+DIFF27+DIFF28+DIFF29+DIFF30+
DIFF31+DIFF32)/32;
DAP=SQRT(DAPERF);
*COMPUTE DACOR FOR PERF RATINGS AS FOLLOWS;
*P=PPRIME1;*T=TPRIME1;*OUTPUT;
*P=PPRIME2;*T=TPRIME2;*OUTPUT;
*P=PPRIME3;*T=TPRIME3;*OUTPUT;
*P=PPRIME4;*T=TPRIME4;*OUTPUT;
*P=PPRIME5;*T=TPRIME5;*OUTPUT;
*P=PPRIME6;*T=TPRIME6;*OUTPUT;
*P=PPRIME7;*T=TPRIME7;*OUTPUT;
*P=PPRIME8;*T=TPRIME8;*OUTPUT;
*P=PPRIME9;*T=TPRIME9;*OUTPUT;
*P=PPRIME10;*T=TPRIME10;*OUTPUT;
*P=PPRIME11;*T=TPRIME11;*OUTPUT;
*P=PPRIME12;*T=TPRIME12;*OUTPUT;
*P=PPRIME13;*T=TPRIME13;*OUTPUT;
*P=PPRIME14;*T=TPRIME14;*OUTPUT;
*P=PPRIME15;*T=TPRIME15;*OUTPUT;
*P=PPRIME16;*T=TPRIME16;*OUTPUT;
*P=PPRIME17;*T=TPRIME17;*OUTPUT;
*P=PPRIME18;*T=TPRIME18;*OUTPUT;
*P=PPRIME19;*T=TPRIME19;*OUTPUT;
*P=PPRIME20;*T=TPRIME20;*OUTPUT;
*P=PPRIME21;*T=TPRIME21;*OUTPUT;
*P=PPRIME22;*T=TPRIME22;*OUTPUT;
*P=PPRIME23;*T=TPRIME23;*OUTPUT;

```

```

*P=PPRIME24;*T=TPRIME24;*OUTPUT;
*P=PPRIME25;*T=TPRIME25;*OUTPUT;
*P=PPRIME26;*T=TPRIME26;*OUTPUT;
*P=PPRIME27;*T=TPRIME27;*OUTPUT;
*P=PPRIME28;*T=TPRIME28;*OUTPUT;
*P=PPRIME29;*T=TPRIME29;*OUTPUT;
*P=PPRIME30;*T=TPRIME30;*OUTPUT;
*P=PPRIME31;*T=TPRIME31;*OUTPUT;
*P=PPRIME32;*T=TPRIME32;*OUTPUT;
*CORRELATE P AND T LATER;
*MODIFICATIONS FOR FREQUENCY RATINGS HERE;
FMRAT1=MEAN(F1,F2,F3,F4,F5,F6,F7,F8,F9,F10,F11,F12);
FMRAT2=MEAN(F13,F14,F15,F16,F17,F18,F19,F20,F21,F22,F23,F24);
FMRAT3=MEAN(F25,F26,F27,F28,F29,F30,F31,F32,F33,F34,F35,F36);
FMRAT4=MEAN(F37,F38,F39,F40,F41,F42,F43,F44,F45,F46,F47,F48);
FMDIM1=MEAN(F1,F13,F25,F37);
FMDIM2=MEAN(F2,F14,F26,F38);
FMDIM3=MEAN(F3,F15,F27,F39);
FMDIM4=MEAN(F4,F16,F28,F40);
FMDIM5=MEAN(F5,F17,F29,F41);
FMDIM6=MEAN(F6,F18,F30,F42);
FMDIM7=MEAN(F7,F19,F31,F43);
FMDIM8=MEAN(F8,F20,F32,F44);
FMDIM9=MEAN(F9,F21,F33,F45);
FMDIM10=MEAN(F10,F22,F34,F46);
FMDIM11=MEAN(F11,F23,F35,F47);
FMDIM12=MEAN(F12,F24,F36,F48);
*TRUES FOR FREQUENCIES GO HERE;
TFMRAT1=MEAN(TF1,TF2,TF3,TF4,TF5,TF6,TF7,TF8,TF9,TF10,TF11,TF12);
TFMRAT2=MEAN(TF13,TF14,TF15,TF16,TF17,TF18,TF19,TF20,TF21,TF22,TF23,
TF24);
TFMRAT3=MEAN(TF25,TF26,TF27,TF28,TF29,TF30,TF31,TF32,TF33,TF34,
TF35,TF36);
TFMRAT4=MEAN(TF37,TF38,TF39,TF40,TF41,TF42,TF43,TF44,TF45,TF46,
TF47,TF48);
TFMDIM1=MEAN(TF1,TF13,TF25,TF37);
TFMDIM2=MEAN(TF2,TF14,TF26,TF38);
TFMDIM3=MEAN(TF3,TF15,TF27,TF39);
TFMDIM4=MEAN(TF4,TF16,TF28,TF40);
TFMDIM5=MEAN(TF5,TF17,TF29,TF41);
TFMDIM6=MEAN(TF6,TF18,TF30,TF42);
TFMDIM7=MEAN(TF7,TF19,TF31,TF43);
TFMDIM8=MEAN(TF8,TF20,TF32,TF44);
TFMDIM9=MEAN(TF9,TF21,TF33,TF45);
TFMDIM10=MEAN(TF10,TF22,TF34,TF46);
TFMDIM11=MEAN(TF11,TF23,TF35,TF47);
TFMDIM12=MEAN(TF12,TF24,TF36,TF48);
FMOVER=MEAN(F1,F2,F3,F4,F5,F6,F7,F8,F9,F10,F11,F12,F13,F14,F15,F16,
F17,F18,F19,F20,F21,F22,F23,F24,F25,F26,F27,F28,F29,F30,F31,F32,F33,
F34,F35,F36,F37,F38,F39,F40,F41,F42,F43,F44,F45,F46,F47,F48);
TFMOVER=MEAN(TF1,TF2,TF3,TF4,TF5,TF6,TF7,TF8,TF9,TF10,TF11,TF12,
TF13,TF14,TF15,TF16,TF17,TF18,TF19,TF20,TF21,TF22,TF23,TF24,TF25,TF26,
TF27,TF28,TF29,TF30,TF31,TF32,TF33,TF34,TF35,TF36,TF37,TF38,TF39,TF40,
TF41,TF42,TF43,TF44,TF45,TF46,TF47,TF48);
*COMPUTE P' AND T' (FREQUENCY RATINGS);

```

FPR1=(F1-FMRAT1-FMDIM1+FMOVER);
 FPR2=(F2-FMRAT1-FMDIM2+FMOVER);
 FPR3=(F3-FMRAT1-FMDIM3+FMOVER);
 FPR4=(F4-FMRAT1-FMDIM4+FMOVER);
 FPR5=(F5-FMRAT1-FMDIM5+FMOVER);
 FPR6=(F6-FMRAT1-FMDIM6+FMOVER);
 FPR7=(F7-FMRAT1-FMDIM7+FMOVER);
 FPR8=(F8-FMRAT1-FMDIM8+FMOVER);
 FPR9=(F9-FMRAT1-FMDIM9+FMOVER);
 FPR10=(F10-FMRAT1-FMDIM10+FMOVER);
 FPR11=(F11-FMRAT1-FMDIM11+FMOVER);
 FPR12=(F12-FMRAT1-FMDIM12+FMOVER);
 FPR13=(F13-FMRAT2-FMDIM1+FMOVER);
 FPR14=(F14-FMRAT2-FMDIM2+FMOVER);
 FPR15=(F15-FMRAT2-FMDIM3+FMOVER);
 FPR16=(F16-FMRAT2-FMDIM4+FMOVER);
 FPR17=(F17-FMRAT2-FMDIM5+FMOVER);
 FPR18=(F18-FMRAT2-FMDIM6+FMOVER);
 FPR19=(F19-FMRAT2-FMDIM7+FMOVER);
 FPR20=(F20-FMRAT2-FMDIM8+FMOVER);
 FPR21=(F21-FMRAT2-FMDIM9+FMOVER);
 FPR22=(F22-FMRAT2-FMDIM10+FMOVER);
 FPR23=(F23-FMRAT2-FMDIM11+FMOVER);
 FPR24=(F24-FMRAT2-FMDIM12+FMOVER);
 FPR25=(F25-FMRAT3-FMDIM1+FMOVER);
 FPR26=(F26-FMRAT3-FMDIM2+FMOVER);
 FPR27=(F27-FMRAT3-FMDIM3+FMOVER);
 FPR28=(F28-FMRAT3-FMDIM4+FMOVER);
 FPR29=(F29-FMRAT3-FMDIM5+FMOVER);
 FPR30=(F30-FMRAT3-FMDIM6+FMOVER);
 FPR31=(F31-FMRAT3-FMDIM7+FMOVER);
 FPR32=(F32-FMRAT3-FMDIM8+FMOVER);
 FPR33=(F33-FMRAT3-FMDIM9+FMOVER);
 FPR34=(F34-FMRAT3-FMDIM10+FMOVER);
 FPR35=(F35-FMRAT3-FMDIM11+FMOVER);
 FPR36=(F36-FMRAT3-FMDIM12+FMOVER);
 FPR37=(F37-FMRAT4-FMDIM1+FMOVER);
 FPR38=(F38-FMRAT4-FMDIM2+FMOVER);
 FPR39=(F39-FMRAT4-FMDIM3+FMOVER);
 FPR40=(F40-FMRAT4-FMDIM4+FMOVER);
 FPR41=(F41-FMRAT4-FMDIM5+FMOVER);
 FPR42=(F42-FMRAT4-FMDIM6+FMOVER);
 FPR43=(F43-FMRAT4-FMDIM7+FMOVER);
 FPR44=(F44-FMRAT4-FMDIM8+FMOVER);
 FPR45=(F45-FMRAT4-FMDIM9+FMOVER);
 FPR46=(F46-FMRAT4-FMDIM10+FMOVER);
 FPR47=(F47-FMRAT4-FMDIM11+FMOVER);
 FPR48=(F48-FMRAT4-FMDIM12+FMOVER);
 TFPR1=(TF1-TFMRAT1-TFMDIM1+TFMOVER);
 TFPR2=(TF2-TFMRAT1-TFMDIM2+TFMOVER);
 TFPR3=(TF3-TFMRAT1-TFMDIM3+TFMOVER);
 TFPR4=(TF4-TFMRAT1-TFMDIM4+TFMOVER);
 TFPR5=(TF5-TFMRAT1-TFMDIM5+TFMOVER);
 TFPR6=(TF6-TFMRAT1-TFMDIM6+TFMOVER);
 TFPR7=(TF7-TFMRAT1-TFMDIM7+TFMOVER);

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TFPR8=(TF8-TFMRAT1-TFMDIM8+TFMOVER);
TFPR9=(TF9-TFMRAT1-TFMDIM9+TFMOVER);
TFPR10=(TF10-TFMRAT1-TFMDIM10+TFMOVER);
TFPR11=(TF11-TFMRAT1-TFMDIM11+TFMOVER);
TFPR12=(TF12-TFMRAT1-TFMDIM12+TFMOVER);
TFPR13=(TF13-TFMRAT2-TFMDIM1+TFMOVER);
TFPR14=(TF14-TFMRAT2-TFMDIM2+TFMOVER);
TFPR15=(TF15-TFMRAT2-TFMDIM3+TFMOVER);
TFPR16=(TF16-TFMRAT2-TFMDIM4+TFMOVER);
TFPR17=(TF17-TFMRAT2-TFMDIM5+TFMOVER);
TFPR18=(TF18-TFMRAT2-TFMDIM6+TFMOVER);
TFPR19=(TF19-TFMRAT2-TFMDIM7+TFMOVER);
TFPR20=(TF20-TFMRAT2-TFMDIM8+TFMOVER);
TFPR21=(TF21-TFMRAT2-TFMDIM9+TFMOVER);
TFPR22=(TF22-TFMRAT2-TFMDIM10+TFMOVER);
TFPR23=(TF23-TFMRAT2-TFMDIM11+TFMOVER);
TFPR24=(TF24-TFMRAT2-TFMDIM12+TFMOVER);
TFPR25=(TF25-TFMRAT3-TFMDIM1+TFMOVER);
TFPR26=(TF26-TFMRAT3-TFMDIM2+TFMOVER);
TFPR27=(TF27-TFMRAT3-TFMDIM3+TFMOVER);
TFPR28=(TF28-TFMRAT3-TFMDIM4+TFMOVER);
TFPR29=(TF29-TFMRAT3-TFMDIM5+TFMOVER);
TFPR30=(TF30-TFMRAT3-TFMDIM6+TFMOVER);
TFPR31=(TF31-TFMRAT3-TFMDIM7+TFMOVER);
TFPR32=(TF32-TFMRAT3-TFMDIM8+TFMOVER);
TFPR33=(TF33-TFMRAT3-TFMDIM9+TFMOVER);
TFPR34=(TF34-TFMRAT3-TFMDIM10+TFMOVER);
TFPR35=(TF35-TFMRAT3-TFMDIM11+TFMOVER);
TFPR36=(TF36-TFMRAT3-TFMDIM12+TFMOVER);
TFPR37=(TF37-TFMRAT4-TFMDIM1+TFMOVER);
TFPR38=(TF38-TFMRAT4-TFMDIM2+TFMOVER);
TFPR39=(TF39-TFMRAT4-TFMDIM3+TFMOVER);
TFPR40=(TF40-TFMRAT4-TFMDIM4+TFMOVER);
TFPR41=(TF41-TFMRAT4-TFMDIM5+TFMOVER);
TFPR42=(TF42-TFMRAT4-TFMDIM6+TFMOVER);
TFPR43=(TF43-TFMRAT4-TFMDIM7+TFMOVER);
TFPR44=(TF44-TFMRAT4-TFMDIM8+TFMOVER);
TFPR45=(TF45-TFMRAT4-TFMDIM9+TFMOVER);
TFPR46=(TF46-TFMRAT4-TFMDIM10+TFMOVER);
TFPR47=(TF47-TFMRAT4-TFMDIM11+TFMOVER);
TFPR48=(TF48-TFMRAT4-TFMDIM12+TFMOVER);
FDIFF1=(FPR1-TFPR1)**2;
FDIFF2=(FPR2-TFPR2)**2;
FDIFF3=(FPR3-TFPR3)**2;
FDIFF4=(FPR4-TFPR4)**2;
FDIFF5=(FPR5-TFPR5)**2;
FDIFF6=(FPR6-TFPR6)**2;
FDIFF7=(FPR7-TFPR7)**2;
FDIFF8=(FPR8-TFPR8)**2;
FDIFF9=(FPR9-TFPR9)**2;
FDIFF10=(FPR10-TFPR10)**2;
FDIFF11=(FPR11-TFPR11)**2;
FDIFF12=(FPR12-TFPR12)**2;
FDIFF13=(FPR13-TFPR13)**2;
FDIFF14=(FPR14-TFPR14)**2;

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FDIFF15=(FPR15-TFPR15)**2;
FDIFF16=(FPR16-TFPR16)**2;
FDIFF17=(FPR17-TFPR17)**2;
FDIFF18=(FPR18-TFPR18)**2;
FDIFF19=(FPR19-TFPR19)**2;
FDIFF20=(FPR20-TFPR20)**2;
FDIFF21=(FPR21-TFPR21)**2;
FDIFF22=(FPR22-TFPR22)**2;
FDIFF23=(FPR23-TFPR23)**2;
FDIFF24=(FPR24-TFPR24)**2;
FDIFF25=(FPR25-TFPR25)**2;
FDIFF26=(FPR26-TFPR26)**2;
FDIFF27=(FPR27-TFPR27)**2;
FDIFF28=(FPR28-TFPR28)**2;
FDIFF29=(FPR29-TFPR29)**2;
FDIFF30=(FPR30-TFPR30)**2;
FDIFF31=(FPR31-TFPR31)**2;
FDIFF32=(FPR32-TFPR32)**2;
FDIFF33=(FPR33-TFPR33)**2;
FDIFF34=(FPR34-TFPR34)**2;
FDIFF35=(FPR35-TFPR35)**2;
FDIFF36=(FPR36-TFPR36)**2;
FDIFF37=(FPR37-TFPR37)**2;
FDIFF38=(FPR38-TFPR38)**2;
FDIFF39=(FPR39-TFPR39)**2;
FDIFF40=(FPR40-TFPR40)**2;
FDIFF41=(FPR41-TFPR41)**2;
FDIFF42=(FPR42-TFPR42)**2;
FDIFF43=(FPR43-TFPR43)**2;
FDIFF44=(FPR44-TFPR44)**2;
FDIFF45=(FPR45-TFPR45)**2;
FDIFF46=(FPR46-TFPR46)**2;
FDIFF47=(FPR47-TFPR47)**2;
FDIFF48=(FPR48-TFPR48)**2;
DAFREQ=(FDIFF1+FDIFF2+FDIFF3+FDIFF4+FDIFF5+FDIFF6+FDIFF7+FDIFF8+FDIFF9+
FDIFF10+FDIFF11+FDIFF12+FDIFF13+FDIFF14+FDIFF15+FDIFF16+FDIFF17+FDIFF18+
FDIFF19+FDIFF20+FDIFF21+FDIFF22+FDIFF23+FDIFF24+FDIFF25+FDIFF26+FDIFF27+
FDIFF28+FDIFF29+FDIFF30+FDIFF31+FDIFF32+FDIFF33+FDIFF34+FDIFF35+FDIFF36+
FDIFF37+FDIFF38+FDIFF39+FDIFF40+FDIFF41+FDIFF42+FDIFF43+FDIFF44+FDIFF45+
FDIFF46+FDIFF47+FDIFF48)/48;
DAF=SQRT(DAFREQ);
*COMPUTE DACOR FOR FREQ RATINGS AS FOLLOWS;
*F=FPR1;*FT=TFPR1;*OUTPUT;
*F=FPR2;*FT=TFPR2;*OUTPUT;
*F=FPR3;*FT=TFPR3;*OUTPUT;
*F=FPR4;*FT=TFPR4;*OUTPUT;
*F=FPR5;*FT=TFPR5;*OUTPUT;
*F=FPR6;*FT=TFPR6;*OUTPUT;
*F=FPR7;*FT=TFPR7;*OUTPUT;
*F=FPR8;*FT=TFPR8;*OUTPUT;
*F=FPR9;*FT=TFPR9;*OUTPUT;
*F=FPR10;*FT=TFPR10;*OUTPUT;
*F=FPR11;*FT=TFPR11;*OUTPUT;
*F=FPR12;*FT=TFPR12;*OUTPUT;
*F=FPR13;*FT=TFPR13;*OUTPUT;

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*F=FPR14;*FT=TFPR14;*OUTPUT;
*F=FPR15;*FT=TFPR15;*OUTPUT;
*F=FPR16;*FT=TFPR16;*OUTPUT;
*F=FPR17;*FT=TFPR17;*OUTPUT;
*F=FPR18;*FT=TFPR18;*OUTPUT;
*F=FPR19;*FT=TFPR19;*OUTPUT;
*F=FPR20;*FT=TFPR20;*OUTPUT;
*F=FPR21;*FT=TFPR21;*OUTPUT;
*F=FPR22;*FT=TFPR22;*OUTPUT;
*F=FPR23;*FT=TFPR23;*OUTPUT;
*F=FPR24;*FT=TFPR24;*OUTPUT;
*F=FPR25;*FT=TFPR25;*OUTPUT;
*F=FPR26;*FT=TFPR26;*OUTPUT;
*F=FPR27;*FT=TFPR27;*OUTPUT;
*F=FPR28;*FT=TFPR28;*OUTPUT;
*F=FPR29;*FT=TFPR29;*OUTPUT;
*F=FPR30;*FT=TFPR30;*OUTPUT;
*F=FPR31;*FT=TFPR31;*OUTPUT;
*F=FPR32;*FT=TFPR32;*OUTPUT;
*F=FPR33;*FT=TFPR33;*OUTPUT;
*F=FPR34;*FT=TFPR34;*OUTPUT;
*F=FPR35;*FT=TFPR35;*OUTPUT;
*F=FPR36;*FT=TFPR36;*OUTPUT;
*F=FPR37;*FT=TFPR37;*OUTPUT;
*F=FPR38;*FT=TFPR38;*OUTPUT;
*F=FPR39;*FT=TFPR39;*OUTPUT;
*F=FPR40;*FT=TFPR40;*OUTPUT;
*F=FPR41;*FT=TFPR41;*OUTPUT;
*F=FPR42;*FT=TFPR42;*OUTPUT;
*F=FPR43;*FT=TFPR43;*OUTPUT;
*F=FPR44;*FT=TFPR44;*OUTPUT;
*F=FPR45;*FT=TFPR45;*OUTPUT;
*F=FPR46;*FT=TFPR46;*OUTPUT;
*F=FPR47;*FT=TFPR47;*OUTPUT;
*F=FPR48;*FT=TFPR48;*OUTPUT;
*CORRELATE F AND FT LATER;
*elevation is calculated as follows;
EL=(PMOVERAL-TMOVERAL)**2;
EP=sqrt(el);
*differential elevation is calculated as follows;
DELEV1=((PMRATEE1-PMOVERAL)-(TMRATEE1-TMOVERAL))**2;
DELEV2=((PMRATEE2-PMOVERAL)-(TMRATEE2-TMOVERAL))**2;
DELEV3=((PMRATEE3-PMOVERAL)-(TMRATEE3-TMOVERAL))**2;
DELEV4=((PMRATEE4-PMOVERAL)-(TMRATEE4-TMOVERAL))**2;
DIFELEV=MEAN(DELEV1,DELEV2,DELEV3,DELEV4);
DEP=SQRT(DIFELEV);
*stereotypic accuracy is calculated as follows;
STER1=((PMDIM1-PMOVERAL)-(TMDIM1-TMOVERAL))**2;
STER2=((PMDIM2-PMOVERAL)-(TMDIM2-TMOVERAL))**2;
STER3=((PMDIM3-PMOVERAL)-(TMDIM3-TMOVERAL))**2;
STER4=((PMDIM4-PMOVERAL)-(TMDIM4-TMOVERAL))**2;
STER5=((PMDIM5-PMOVERAL)-(TMDIM5-TMOVERAL))**2;
STER6=((PMDIM6-PMOVERAL)-(TMDIM6-TMOVERAL))**2;
STER7=((PMDIM7-PMOVERAL)-(TMDIM7-TMOVERAL))**2;
STER8=((PMDIM8-PMOVERAL)-(TMDIM8-TMOVERAL))**2;

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STEREOT=MEAN(STER1,STER2,STER3,STER4,STER5,STER6,STER7,STER8);
SAP=SQRT(STEREOT);
*FOLLOWING ARE THE CALCULATIONS FOR FREQUENCY RATINGS;
*elevation is calculated as follows;
ELEVA=(FMOVER-TFMOVER)**2;
EF=sqrt(eleval);
*differential elevation is calculated as follows;
DEL1=((FMRAT1-FMOVER)-(TFMRAT1-TFMOVER))**2;
DEL2=((FMRAT2-FMOVER)-(TFMRAT2-TFMOVER))**2;
DEL3=((FMRAT3-FMOVER)-(TFMRAT3-TFMOVER))**2;
DEL4=((FMRAT4-FMOVER)-(TFMRAT4-TFMOVER))**2;
DIFEL=MEAN(DEL1,DEL2,DEL3,DEL4);
DEF=SQRT(DIFEL);
*stereotypic accuracy is calculated as follows;
STE1=((FMDIM1-FMOVER)-(TFMDIM1-TFMOVER))**2;
STE2=((FMDIM2-FMOVER)-(TFMDIM2-TFMOVER))**2;
STE3=((FMDIM3-FMOVER)-(TFMDIM3-TFMOVER))**2;
STE4=((FMDIM4-FMOVER)-(TFMDIM4-TFMOVER))**2;
STE5=((FMDIM5-FMOVER)-(TFMDIM5-TFMOVER))**2;
STE6=((FMDIM6-FMOVER)-(TFMDIM6-TFMOVER))**2;
STE7=((FMDIM7-FMOVER)-(TFMDIM7-TFMOVER))**2;
STE8=((FMDIM8-FMOVER)-(TFMDIM8-TFMOVER))**2;
STE9=((FMDIM9-FMOVER)-(TFMDIM9-TFMOVER))**2;
STE10=((FMDIM10-FMOVER)-(TFMDIM10-TFMOVER))**2;
STE11=((FMDIM11-FMOVER)-(TFMDIM11-TFMOVER))**2;
STE12=((FMDIM12-FMOVER)-(TFMDIM12-TFMOVER))**2;
STEREO=MEAN(STE1,STE2,STE3,STE4,STE5,STE6,STE7,STE8,STE9,STE10,
STE11,STE12);
SAF=SQRT(STEREO);
*COMPUTE SACOR FOR BOTH PERF AND FREQ RATINGS AS FOLLOWS;
*SP=PMDIM1;*ST=TMDIM1;*OUTPUT;
*SP=PMDIM2;*ST=TMDIM2;*OUTPUT;
*SP=PMDIM3;*ST=TMDIM3;*OUTPUT;
*SP=PMDIM4;*ST=TMDIM4;*OUTPUT;
*SP=PMDIM5;*ST=TMDIM5;*OUTPUT;
*SP=PMDIM6;*ST=TMDIM5;*OUTPUT;
*SP=PMDIM7;*ST=TMDIM7;*OUTPUT;
*SP=PMDIM8;*ST=TMDIM8;*OUTPUT;
*SF=FMDIM1;*STF=TFMDIM1;*OUTPUT;
*SF=FMDIM2;*STF=TFMDIM2;*OUTPUT;
*SF=FMDIM3;*STF=TFMDIM3;*OUTPUT;
*SF=FMDIM4;*STF=TFMDIM4;*OUTPUT;
*SF=FMDIM5;*STF=TFMDIM5;*OUTPUT;
*SF=FMDIM6;*STF=TFMDIM5;*OUTPUT;
*SF=FMDIM7;*STF=TFMDIM7;*OUTPUT;
*SF=FMDIM8;*STF=TFMDIM8;*OUTPUT;
*SF=FMDIM9;*STF=TFMDIM9;*OUTPUT;
*SF=FMDIM10;*STF=TFMDIM10;*OUTPUT;
*SF=FMDIM11;*STF=TFMDIM11;*OUTPUT;
*SF=FMDIM12;*STF=TFMDIM12;*OUTPUT;
*COMPUTE DECOR FOR BOTH PERF AND FREQ RATINGS AS FOLLOWS;
*DECP=PMRATEE1;*DECT=TMRATEE1;*OUTPUT;
*DECP=PMRATEE2;*DECT=TMRATEE2;*OUTPUT;
*DECP=PMRATEE3;*DECT=TMRATEE3;*OUTPUT;
*DECP=PMRATEE4;*DECT=TMRATEE4;*OUTPUT;

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*DECFF=FMRRAT1;*DECFT=TFMRAT1;*OUTPUT;
*DECFF=FMRRAT2;*DECFT=TFMRAT2;*OUTPUT;
*DECFF=FMRRAT3;*DECFT=TFMRAT3;*OUTPUT;
*DECFF=FMRRAT4;*DECFT=TFMRAT4;*OUTPUT;
*COMPUTE OVERAL ACCURACY AS FOLLOWS;
GLOB1=(P1-T1)**2;
GLOB2=(P2-T2)**2;
GLOB3=(P3-T3)**2;
GLOB4=(P4-T4)**2;
GLOB5=(P5-T5)**2;
GLOB6=(P6-T6)**2;
GLOB7=(P7-T7)**2;
GLOB8=(P8-T8)**2;
GLOB9=(P9-T9)**2;
GLOB10=(P10-T10)**2;
GLOB11=(P11-T11)**2;
GLOB12=(P12-T12)**2;
GLOB13=(P13-T13)**2;
GLOB14=(P14-T14)**2;
GLOB15=(P15-T15)**2;
GLOB16=(P16-T16)**2;
GLOB17=(P17-T17)**2;
GLOB18=(P18-T18)**2;
GLOB19=(P19-T19)**2;
GLOB20=(P20-T20)**2;
GLOB21=(P21-T21)**2;
GLOB22=(P22-T22)**2;
GLOB23=(P23-T23)**2;
GLOB24=(P24-T24)**2;
GLOB25=(P25-T25)**2;
GLOB26=(P26-T26)**2;
GLOB27=(P27-T27)**2;
GLOB28=(P28-T28)**2;
GLOB29=(P29-T29)**2;
GLOB30=(P30-T30)**2;
GLOB31=(P31-T31)**2;
GLOB32=(P32-T32)**2;
TOTACCP=MEAN(GLOB1,GLOB2,GLOB3,GLOB4,GLOB5,GLOB6,GLOB7,GLOB8,
GLOB9,GLOB10,GLOB11,GLOB12,GLOB13,GLOB14,GLOB15,GLOB16,GLOB17,
GLOB18,GLOB19,GLOB20,GLOB21,GLOB22,GLOB23,GLOB24,GLOB25,GLOB26,
GLOB27,GLOB28,GLOB29,GLOB30,GLOB31,GLOB32);
CKPERF=TOTACCP-(STEREOT+DIFELEV+EL+DAPERF);
GLOBAL1=(F1-TF1)**2;
GLOBAL2=(F2-TF2)**2;
GLOBAL3=(F3-TF3)**2;
GLOBAL4=(F4-TF4)**2;
GLOBAL5=(F5-TF5)**2;
GLOBAL6=(F6-TF6)**2;
GLOBAL7=(F7-TF7)**2;
GLOBAL8=(F8-TF8)**2;
GLOBAL9=(F9-TF9)**2;
GLOBAL10=(F10-TF10)**2;
GLOBAL11=(F11-TF11)**2;
GLOBAL12=(F12-TF12)**2;
GLOBAL13=(F13-TF13)**2;

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GLOBAL14=(F14-TF14)**2;
GLOBAL15=(F15-TF15)**2;
GLOBAL16=(F16-TF16)**2;
GLOBAL17=(F17-TF17)**2;
GLOBAL18=(F18-TF18)**2;
GLOBAL19=(F19-TF19)**2;
GLOBAL20=(F20-TF20)**2;
GLOBAL21=(F21-TF21)**2;
GLOBAL22=(F22-TF22)**2;
GLOBAL23=(F23-TF23)**2;
GLOBAL24=(F24-TF24)**2;
GLOBAL25=(F25-TF25)**2;
GLOBAL26=(F26-TF26)**2;
GLOBAL27=(F27-TF27)**2;
GLOBAL28=(F28-TF28)**2;
GLOBAL29=(F29-TF29)**2;
GLOBAL30=(F30-TF30)**2;
GLOBAL31=(F31-TF31)**2;
GLOBAL32=(F32-TF32)**2;
GLOBAL33=(F33-TF33)**2;
GLOBAL34=(F34-TF34)**2;
GLOBAL35=(F35-TF35)**2;
GLOBAL36=(F36-TF36)**2;
GLOBAL37=(F37-TF37)**2;
GLOBAL38=(F38-TF38)**2;
GLOBAL39=(F39-TF39)**2;
GLOBAL40=(F40-TF40)**2;
GLOBAL41=(F41-TF41)**2;
GLOBAL42=(F42-TF42)**2;
GLOBAL43=(F43-TF43)**2;
GLOBAL44=(F44-TF44)**2;
GLOBAL45=(F45-TF45)**2;
GLOBAL46=(F46-TF46)**2;
GLOBAL47=(F47-TF47)**2;
GLOBAL48=(F48-TF48)**2;
TOTACCF=MEAN(GLOBAL1,GLOBAL2,GLOBAL3,GLOBAL4,GLOBAL5,GLOBAL6,
GLOBAL7,GLOBAL8,GLOBAL9,GLOBAL10,GLOBAL11,GLOBAL12,GLOBAL13,
GLOBAL14,GLOBAL15,GLOBAL16,GLOBAL17,GLOBAL18,GLOBAL19,GLOBAL20,
GLOBAL21,GLOBAL22,GLOBAL23,GLOBAL24,GLOBAL25,GLOBAL26,GLOBAL27,
GLOBAL28,GLOBAL29,GLOBAL30,GLOBAL31,GLOBAL32,GLOBAL33,GLOBAL34,
GLOBAL35,GLOBAL36,GLOBAL37,GLOBAL38,GLOBAL39,GLOBAL40,GLOBAL41,
GLOBAL42,GLOBAL43,GLOBAL44,GLOBAL45,GLOBAL46,GLOBAL47,GLOBAL48);
CKFREQ=TOTACCF-(STEREO+DIFEL+ELEVA+DAFREQ);
KEEP ID DAPERF DAFREQ ELEVA EL DIFELEV DIFEL STEREOT STEREO
DAP DAF SAP SAF EP EF DEP DEF TOTACCP TOTACCF
CKPERF CKFREQ;
cards;

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```

PROC SORT DATA=THREE; BY ID;
DATA BOTH;
MERGE ONE TWO THREE; BY ID;
PROC PRINT; VAR REP DIMS DAP DAF SAP SAF EP EF DEP DEF
    DARP DARF SARP SARF DERP DERF TOTACCP TOTACCF CKPERF CKFREQ;
BY ID;
PROC FREQ; TABLES PAYJOB TITLE MGNOMG ORGFUNC SEX DIMS;
PROC CORR DATA=BOTH; VAR PAYJOB YRSWORK MGNOMG AGE YRCOLL SEX
    REP DIMS DAP DAF SAP SAF EP EF DEP DEF DARP DARF SARP SARF
    DERP DERF TOTACCP TOTACCF;
PROC RANK DATA=BOTH OUT=LAST GROUPS=3;
VAR YRSWORK;
RANKS EXPER;
PROC ANOVA DATA=LAST;
CLASS EXPER;
MODEL DEP DEF=EXPER;
*MODEL DAP DAF SAP SAF EP EF DEP DEF=EXPER;
MEANS EXPER/TUKEY;
PROC SORT; BY EXPER;
PROC MEANS; VAR DAP DAF SAP SAF EP EF DEP DEF;
BY EXPER;
*PROC CORR DATA=ONE; *VAR P T; *BY ID;
*PROC CORR DATA=ONE; *VAR F FT; *BY ID;
*PROC CORR DATA=ONE; *VAR SP ST; *BY ID;
*PROC CORR DATA=ONE; *VAR SF STF; *BY ID;
*PROC CORR DATA=ONE; *VAR DECP DECT; *BY ID;
*PROC CORR DATA=ONE; *VAR DECF DECFT; *BY ID;
*/
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