Distance From the Prototype: A Multidimensional Scaling Approach To Personality Assessment

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Abstract

An MDS (MultiDimensional Scaling) model of personality assessment is presented as an alternative method of personality assessment designed to incorporate recently discovered cognitive principles relating to how people mentally organize categories (Roach, 1978), including personality trait categories (Broughton, 1984). The MDS model is shown to generalize from a tool for evaluating the self concept and the semantics of interpersonal categories (Partridge, 1984) to one that taps the full gamut of personality assessment in the interpersonal domain as defined by Wiggins (1979). In this paradigm, subjects rated the similarity of their own personality to prototypical characters described in short stories, or vignettes.

In asking subjects to compare themselves to hypothetical people who display prototypical behaviors (based on the act-frequency prototype analyses of Buss & Craik, 1980), one is able to standardize the measure against which similarity ratings are made. Thus "prototypical dominance" (in this case operationalized as an excellent example of what it means in behavioral terms to be dominant) is the same for each subject, as is prototypical extraversion, aggression, and so on. Unlike traditional self-report measures, the respondent is not required to provide his or her own (possibly idiosyncratic) trait definition.

Study 1 involved the development and use of the vignette
materials in a paper and pencil administration. In this study 25 undergraduate subjects rated the 28 nonredundant pairs of eight vignette characters for similarity. The usefulness of the vignettes as personality testing stimuli was gauged according to structural criteria, namely the circular ordering (circumplexity) to emerge from the MDS analysis of the eight vignette stimuli. Although the results were judged satisfactory, steps were taken in Study 2 to improve the interpersonal meaning of two of the prototype stories, in an attempt to improve the solution.

In Study 3, a microcomputer administration involving 158 participants, subjects compared the eight stimuli for similarity as in Study 1 but also compared themselves (each subject's usual and ideal self) to the eight vignette characters. Derived MDS distances from the prototypical characters were compared with conventional self-report scale scores from four widely used personality inventories (the Personality Research Form, PRF; Adjective Check List, ACL; California Psychological Inventory, CPI; and the Interpersonal Adjective Scales, IAS). Correlational analyses revealed low to moderate congruence between the MDS technique and these traditional personality measures.

Three multiple regression analyses were performed to test how well subjects' MDS distance scores could predict standard trait measures. Results from the first analysis indicated that
MDS measures were better at predicting IAS self-esteem than the four traditional inventories. The second analysis showed that MDS distance scores better predicted IAS dominance than the remaining three inventories. The purpose of the third regression analysis was to test the comparative predictive validity of the MDS scores with a different self-report method -- PRF dominance. The MDS measures placed last in this category, but were not far behind the others.
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It is the nature of the doctoral dissertation beast that it represent far more than the work of the single author that appears on its cover, yet only passing reference, such as this, is given to recognize this fact and list those who deserve far more credit than they receive. I will attempt this difficult task with the realization that it has to fall short of what perhaps should be said, but never is. I will rely on those who know what they contributed to forgive me and take full license to fill in between the lines.

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I. Introduction

In an original and heuristically stimulating Ph.D. dissertation, Partridge (1984) molded a theretofore rather ordinary, but useful, data-analytic technique -- multidimensional scaling (MDS) -- into a novel assessment procedure with measurement properties that should spark interest especially in personality psychology. In her own words, "(the MDS procedure was) conceptualized as a method for activating the social self-schema" (p. iii), in a paper-and-pencil, self-report format. As a standardized assessment instrument, the Partridge MDS test appeared promising with respect to the traditional psychometric criteria of reliability and concurrent validity. Moreover, the MDS similarity-rating procedure was able to replicate structural properties found by factor analytic techniques employed in the analysis of traditional Likert format data, when subjects were asked to judge the semantic similarity of interpersonal stimuli. Specifically, a circumplex-like structure was obtained when the MDS technique was applied to the semantics (judged similarity of meaning) of interpersonal variables with known self-report structural properties, (Wiggins, 1979; Wiggins & Broughton, 1985).

These impressive findings inspired me to propose other contexts, in addition to the self-concept and the semantics of interpersonal variables, where an MDS technology might prove useful in personality psychology. These areas included the use of current cognitive principles for organizing relevant
behaviors into specific dispositional categories, and the development of hypothetical characters to act out these behaviors. The use of multidimensional scaling techniques in personality psychology is not new. What is relatively new is the use of MDS as a stand-alone personality assessment instrument. Although many MDS procedures will do, one set of procedures (used in the present studies) called Multiscale II (Ramaey, 1977), has a number of quantitative and objective features that seem particularly well suited to areas of personality assessment that have traditionally been analyzed with factor analytic techniques. Some of these features will be introduced in the next section, where I describe the usefulness of multidimensional scaling techniques.

II. Why MDS?

Background and Theory

Multidimensional scaling has been employed as a data analytic technique in the study of individual differences for over 30 years now (Messick, 1956a; 1956b). In many early studies MDS was used to explore the dimensionality of personality variables (e.g., Jackson, Messick & Solley, 1957; Rosenberg, Nelson & Vivekanthan, 1968), and not surprisingly in later studies MDS was also used to confirm the structure of personality (e.g., Jones, 1972; Stiles, 1980). MDS is sometimes used in between-subject designs (Kruskal, 1964a; 1964b); or in within-subject or individual differences designs (Carroll & Chang, 1970).
More recently in personality psychology, multidimensional scaling techniques have been used to investigate the cognitive structures that are said to underlie and mediate behavior. Jones (1982), for instance, has shown that the way we encode differences between self and significant others in memory can be accurately quantified and graphically presented in MDS. Moreover, as the same author states in another article (1983, p453) "our [internal] representation of self and others is dimensional, with distances among self and others (and distances among others) reflecting important information about interpersonal relationships". Thus the concept of similarity is used for representing differences in our cognitive schemas of self and others, and MDS is the method for quantifying and displaying these relations.

Interpersonal "similarity" is whatever the judge considers relevant from the wide assortment of behavioral, demographic and other cues that are available. Whatever it is, exactly, that powers the similarity judgments in MDS, it is assumed that the same processes are evoked that occur in actual social comparisons in everyday life. The similarity relations revealed by a judge about her or his social world contain valuable information about that judge's construal of self and others, and the dimensions underlying them. MDS techniques are used to recover the dimensions underlying such similarity judgments and to represent in N-dimensional space the locations of self and significant others. MDS derives a geometric structure from similarity ratings and represents self and others as points in
these N-dimensional hyper-planes (or "spaces") with distances among the points analogous to dissimilarity. To state it another way, the closer two points are in the configuration, the more similar they are said to be.

Individual difference MDS methods, which construct geometric configurations of stimuli from inter-individual comparisons, allow for interpretations of individual construal styles of, say, a common set of interpersonal stimuli. For a personality psychologist there are obvious implications about the relation of personality makeup to one's perception of self and significant others. We might expect, as I do, that construal styles and personality types would be systematically intertwined, and that theory is needed to help explain these relations.

In particular, interpersonal theories of behavior (e.g., Sullivan, 1953) and symbolic interactionist theories (Mead, 1934) seem well suited to the features of an MDS analysis. For instance, Harry Stack Sullivan (1957) viewed personality as the product of an individual's characteristic interactions with others. Later, in extending Sullivan's ideas, Foa and Foa (1974) postulated that one's identity and personality evolve from internalized experiences involving "transactions" of love and status (either granted or taken away) in dyadic or group relations. To translate Sullivan's ideas into modern cognitive terminology, it could be said that our social experiences accumulate and develop over time into a cognitive representation or schema. We encode and represent our interpersonal
experiences for future use. This cognitive "social structure" (Jones & Young, 1972) or social field, is made up primarily of significant others with the self positioned with respect to all of them. As I have attempted to show, MDS can be used to represent and quantify such cognitive structures.

The Analytic Model

As a data analytic technique, multidimensional scaling performs some tasks very much like other multivariate techniques, such as factor analysis (FA) and cluster analysis (CA). Yet MDS possesses features that set it apart. The important similarities and differences can be summarized in the following way.

MDS, FA, and CA have proven useful to researchers essentially because they can simplify and organize complex relationships among stimuli. That being the case, how else does MDS overlap and stand apart from these other techniques?

MDS is similar to the not yet widely used set of cluster analytic procedures insofar as it can be used to identify "clusters" of individuals or stimuli defined according to known or proposed characteristics they are said to possess. MDS can go further in that it can be used to either explore or confirm whatever structural properties, in the form of latent dimensions or traits, may underlie the data. To this extent MDS overlaps with FA. One form of MDS (Multiscale II, to be discussed later) goes a step further than other MDS programs in that it allows for statistical tests of dimensionality. This feature is
heralded by Ramsey (1977) as a qualitative advance that allows the MDS users to sidestep the factor indeterminacy problem that has long plagued common factor analysis.

In another respect, factor analytic techniques presuppose that only linear relationships exist between variables whereas MDS techniques can accommodate nonlinear as well as linear assumptions about the data. Schiffman et al. (1981) point out that this added flexibility with the MDS family of procedures allows for more interpretable solutions at lower dimensionality, as well. Another important difference between these two techniques is that the MDS model uses distances between points to organize data while FA relies on angles between points (which easily gives rise to correlational representations since correlations are simply cosines of the angles between points, or variables). Although both models generally use Euclidean space to project relationships among variables, it is generally easier to interpret distances with MDS than it is to interpret angles between vectors with FA (Shiffman, Reynolds & Young, 1981), even though the correlation coefficient has been the customary standard for expressing degree of relationship. Moreover, because of the use of \( r \) (\( p \)) FA is limited to linear relations, both in data and in interpretations of the solutions.

Perhaps the greatest virtue that MDS can offer the research design discussed here, has to do with the independence with which subjects carry out the MDS task that confronts them in the laboratory. With MDS similarity ratings, each subject
determines which qualities of the stimuli to compare for similarity and not the ones imposed by the experimenter. Thus so called "experimenter contamination" -- where the experimenter abstracts qualities or traits to be judged by the subjects -- is virtually eliminated.

It has also been argued that MDS provides a more parsimonious representation than FA (Guttman, 1966; Schlesinger & Guttman, 1969; Lingoes & Borg, 1979). This argument has been bolstered by the mathematical proofs of Lingoes (1971). Guttman (1966) showed how a 5-factor FA could be better represented in a 2-dimensional nonmetric MDS analysis. In addition, MDS has been suggested as a better procedure for analyzing correlational (metric) measures (Kruskal & Wish, 1978; Shepard, 1972). Finally, Davison (1985), in an extensive series of Monte Carlo studies, looked at the relation between coordinate estimates in principal components analysis and MDS. He also explored the algebraic relations between metric MDS and principal components analysis. Davison found that solutions from the two procedures were essentially equivalent. But in analyzing certain correlation matrices, such as a simplex or a circumplex, the structure can be more parsimoniously represented by MDS than by FA.

There are other advantages in using MDS procedures over traditional ones. One big advantage has to do with the nature of the task that confronts each subject. By having subjects rate the similarity of stimuli, a task they report to be intrinsically simple and uncomplicated to perform (Schiffman et
al., 1981), they are not asked to think in terms of quantities of unusual substances or amounts of intangibles they are not accustomed to dealing with, e.g., rating how authoritarian they or others are or how much charisma they possess on a nine-place scale. Rather, with MDS similarity ratings, subjects can rate their similarity with charismatic or authoritarian behaving others without having to ask for defining information.

And subjects determine which properties are important in the similarity ratings, and they appear to do so consistently both within and between subjects.

Another feature of MDS reported in the literature that is valuable is that the whole process is said to be freer of the social desirability effects which have long haunted and seem inextricably intertwined with traditional self-rating scales (Schiffman et al., 1981; Partridge, 1984). Asking subjects for similarity ratings of stimuli, instead of themselves, presumably takes the focus away from self-evaluation and socially desirable attributions.

**Why Multiscale II?**

One of MULTISCALE II's features (mentioned above) that sets it apart from all other MDS programs currently available is that it possesses facilities that allow the user to perform hypothesis tests. This advance has been labelled a quantum leap by experts in the field (Schiffman et al., 1981) because it can provide answers to hypotheses about the dimensionality underlying data with great precision. Ramsey's (1977, 1980)
MULTISCALE II is able to do this because it is based on a maximum likelihood algorithm instead of a least squares criterion that underlies the others (e.g., current favorites such as ALSCAL, INDSCAL, MINISSA, and POLYCON). Thus Ramsey's program is able to perform chi-square tests to check hypotheses about latent dimensions. This exploratory feature is of limited value in the present studies, however, because MULTISCALE will be used in a confirmatory role to establish whether the two interpersonal dimensions that are posited to account for the majority of variance (dominance and nurturance) actually do. MULTI-SCALE II, therefore, is a set of procedures that is useful for confirmational analyses as well as exploratory ones that the other programs provide.

It also possesses other unique quantitative features that are useful in a personality assessment context. There are four such features of Multiscale II that require some extra explanation here, which are described more fully by Partridge (1984, pp.131-142). These are: (1) the stimulus configuration, (2) the overall stimulus error, (3) the individual stimulus error, and (4) the exponent.

The stimulus configuration: This refers to the geometric relations among variables as well as the dimensionality of the variables under inspection. When the dimensionality of a set of variables is low (i.e., <=3), the stimulus configuration is easily interpretable and graphically portrayable on paper in a manner similar to factor plots in factor analysis. For instance, the relationship between actual and ideal self is
easily viewed in terms of the Euclidean distance between them in two- (or three-) dimensional space.

The overall stimulus error: This reflects a subject's consistency (in the form of intransitivities) in his or her similarity judgments of the stimuli. In other words, the number of times that subjects violate the law of transitivity in their similarity ratings is recorded, i.e., if a subject reports that A is similar to B, B is similar to C, and that A is dissimilar to C, then a transgression is noted which enters into the overall stimulus error, for each subject. A high overall estimate of error indicates a confused subject with a lack of cognitive clarity in this task, or someone who has not taken the task seriously and whose data should be discarded. A convenient index to help gauge the difficulty of the task, as well as to cleanse your data.

Individual stimulus error: This is a fine tuning of above in that one can use this index to see which stimuli contribute to a subject's confusion. It is useful for improvement of stimuli if recurrent troublemakers appear.

The exponent: The exponent is used as an estimate of the variance or how polarized a subject's ratings are. It is a measure of how differentiated the subject is in discriminating among the stimuli and may be used to assess the level of response bias in the sample, and to discard those cases deemed not to differentiate the stimuli.

For a mathematical summary of the MDS model used in this study, see Appendix A.
III. The Interpersonal Circle

Circumplex models of interpersonal behavior have emerged from specialized, yet burgeoning, research areas in personality, social, and clinical psychology and share a rich and diverse history. It has been known for many years that the interrelations among interpersonal variables form an endless circular pattern of highly positively correlated adjacent variables (+.71), highly negatively correlated bipolar opposites (-1.0), and uncorrelated perpendicular variables (.00). In fact, it is possible to trace such a circular ordering back to second century Greek medicine (Wiggins, 1981). More recently, however, researchers have explored the utility of circumplex models for representing behavior in a variety of settings ranging, for example, from maternal and child behavior (Schaefer, 1959, 1961), activities of college students (Stern, 1970), pathological behaviors (Benjamin, 1974; Freedman et al., 1951; Kiesler, 1983; Leary, 1957; Wiggins, 1982), human development (Foa & Foa, 1974), social exchange (Carson, 1979), and, of course, interpersonal behavior (Carson, 1969; Leary, 1957; Wiggins, 1979). Figure 1 provides an example of a robust (replicable) circumplex model (Wiggins, 1979). This is the working model for this study which will be referred to in later sections.
In addition to its wide application in organizing diverse behavioral constructs, a circumplex model has been employed as a structural aid to integrate research in personality and social psychology as well (Wiggins, 1981; Wiggins & Broughton, 1985a). The need for such a device arose primarily for historical reasons.

Personality psychology has witnessed a shift over the years in the theory-to-data ratio that can be said to characterize the field at any given time. Approximately 50 years ago, grand theorizing was what occupied most of the efforts of publishing personality psychologists, as in the tradition of Henry Murray and Gordon Allport. Since then, however, small-scale (sometimes called "domain-specific") theorizing coupled with voluminous empirical support, but with limited cross-fertilization between research programs has evolved into the new research status quo. This is not to suggest that the reasons for this shift were necessarily poorly conceived (that is a task for the historians), such a proliferation of the latter (more precise yet theoretically limited) studies led the editors of one recent book of readings in personality to impose only an alphabetical structure on the order of the variables they present to the reader (London & Exner, 1978).

One way to impose structure other than that provided by a circumplex methodology is to employ a factor analytic model, as did Cattell (1973). But when circular structure is present in data, factor analysis per se is not well suited for discovering it since so called simple structure (i.e., rotating to
orthogonal clusters of variables) is the opposite of circumplexity. That is, rotation does not improve the solution because variables are spaced in an equidistant circular fashion. However, when theory is wedded to factor analytic techniques (e.g., Wiggins, 1979), one possible outcome is a circumplex methodology, especially when two dimensions emerge accounting for the lion's share of variance, as they do in interpersonal self-report data.

In fact, the principal advantage of what has come to be called the Interpersonal Circle (Kiesler, 1983), is that it provides a rationale for interpreting the defining dimensions of interpersonal self-report data as status (also known as power, agency, dominance) and love (solidarity, communion, nurturance). The model allows for precise predictions of the relations of any particular variable to the universe of content of interpersonal behavior once they have been scaled according to the two components of the love and status circumplex. In this way the conceptual meaning of a given measure can be established with respect to the model. Furthermore, hypotheses about the relations of isolated constructs are automatically generated once location in this space has been established. Thus one person's "Machiavellianism" may be another person's "high self-monitoring". Such a model as this speaks explicitly to the conceptual redundancy that has characterized the field of personality psychology (see Wiggins & Broughton, 1985a; 1985b, for more details).

The primary assessment instrument to be used in this study
to provide structural and validational criteria to evaluate the
MDS methodology, is the IAS (Interpersonal Adjective Scales,
Wiggins, 1979). The IAS has been shown to possess the clearest
circumplex structure to date (Wiggins, Steiger, & Gaelick, 1981)
and has been included in numerous research contexts including a
major multi-method analysis just recently published (Wiggins &
Broughton, 1985a) where the IAS formed semantic markers used to
catalog other important self-report measures.

The IAS scales were developed from the pioneering
lexicographic work of Allport and Odbert (1936), Norman (1967),
and Goldberg (1977), who reduced the unwieldy number of
individual difference terms of 27,000 to 4,063. From this,
Wiggins (1979) identified 800 terms that fit the Sullivanian
(and Foa & Foa, 1977) definition of interpersonal trait and,
with two other judges, was able to distribute 567 of these terms
into the sixteen categories originally proposed by Leary
(1957). Through an assortment of empirical, rational, and
psychometric methods (discussed in Wiggins, 1979) the result was
the 128 adjective, 16 scale (eight items each) system that is in
use today. Within each octant (16 traits collapsed into eight)
of the interpersonal system, the IAS scales provide narrow
semantic markers that possess a very high degree of fidelity
(reliability). This makes them ideal to form a structural
criterion such as the one required for the proposed new MDS
measure. It is hypothesised that the MDS method will provide
an alternative device for tapping the interpersonal domain.
Prototypes

Since its inception in 1973 by the cognitive psychologist, Eleanor Rosch, the concept of prototype has received ample exposure in many other research contexts in psychology as well. For example, it has been applied as an organizational construct in clinical psychology in the area of depression (Horowitz, French, and Anderson, 1982), to the area of categories of emotion (Fehr & Russell, 1984), and to help sort personality test items into scales (Broughton, 1984).

For sake of definition, a prototype is a clear-case, best all-round member (or one of a select few) of a particular category. A prototype is a judgment actually, about the membership status of any potential member of any given category. As such prototypes do not exist in nature, they are what Rosch has called "convenient grammatical fictions", and are used to help grade a category's membership in terms of goodness of fit. The revolutionary aspect of prototype theory was that it entailed a different view of cognitive categories than had been held in the past. Whereas traditional category membership is defined in an all-or-none (digital) fashion, Roach (1973) proposed that the natural categories of human thought be viewed as "fuzzy sets" whose spatial (analog) representation possesses loosely defined category boundaries and a membership that is probabilistic rather than discrete.

What do graded membership and goodness-of-fit have to do with personality psychology and multidimensional scaling? The implications of prototype theory for personality assessment
research have been shown to be important in two areas: the development of better assessment devices, and the development of more meaningful criterion measures. Regarding the development of better assessment devices, as mentioned above, I found (1984) that a prototype strategy for combining personality items into scales improved upon the best currently available methods. I accomplished this through the use of prototypicality ratings of prospective items.

Research involving prototype theory in the refinement of criterion measures has been reported by Buss & Craik (1980, 1981, 1983). These authors proposed, and later demonstrated, that personality scales designed to predict behavioral acts indicative of specific dispositional constructs (e.g., dominance) should (and do) predict some acts better than others. As it turned out, those acts rated highest in prototypicality were the ones that were best predicted. Here is how they did it.

From their act-frequency approach to personality assessment which has evolved over the last six years, Buss and Craik (1980) began their research by calibrating the prototypicality of interpersonal acts nominated as representative of interpersonal categories by university students. Subjects were asked to: "Think of the three most (e.g., dominant) females you know. With these individuals in mind, write down the five acts or behaviors they have performed that reflect or exemplify their (e.g., dominance)". After "cleansing" the acts for redundancy or infrequency, the procedure generated lists of 100 acts for
each of eight categories of the interpersonal circumplex (Wiggins, 1979). The next step was to rate the prototypicality of each act with respect to its purported category of membership (e.g., dominance). Thus, for each interpersonal category, a continuum was developed to rank order the acts from highest to lowest prototypicality (Buss & Craik, 1981). It was to the twenty most prototypical acts for each category that much attention has been paid, for they are the acts that define the clearest and most distinct samples of interpersonal categories as defined by Wiggins (1979). Moreover these acts were the ones that correlated most highly with traditional personality scales (e.g., the Personality Research Form and California Psychological Inventory).

Present Studies

The idea that one could construct stories about hypothetical characters that each portray prototypical behaviors from a single trait category was one that emerged from the weekly meetings of the Individual Differences Lab at the University of British Columbia. At the time, we were concerned with developing an instrument to assess the way others make us feel. Thus we needed a set of standardized trait stimuli to explore the possibility that different personality types give off different "messages" to others and that these messages may be used to assess personality. It was in the context of that study that I developed the first version in a series of sets of vignette characters that portrayed clear-cut prototypical trait
behaviors in a story about a typical day in each of their lives.

The way I developed the vignette stories was to begin with the prototypical acts assembled by Buss & Craik (1983). For each trait I took the twenty most prototypical acts and through a series of successive approximations (with the help of Paul Trapnell), I assembled them into a story that was true to the spirit of the trait message -- that is, with little in the way of filler material. Likewise for eight clusters of twenty most prototypical acts sampled equidistantly around the Wiggins circumplex, we developed homogeneous vignettes (or narratives) about "a day in the life of" eight hypothetical characters. Table 1 contains the twenty most prototypic acts identified by Buss and Craik (1980) for the category of dominance. Appendix B contains the "day in the life"

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insert Table 1 about here
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vignette developed from ten of these prototypically dominant acts, as well as the vignettes developed from the seven other prototypical act lists.

Introduction to the Studies

In the studies to be described, the eight vignette characters were used in an MDS similarity rating format in an
attempt to better assess individual personalities by standardizing the targets against which subjects compare themselves. Unlike traditional self-report measures, the respondent in these studies is not required to provide his or her own (possibly idiosyncratic) trait definition. Nor is the subject required to evaluate the characters using terms or phrases supplied by the experimenter, as discussed earlier, which may lead to distorted attributions. Commenting on this and other sources of subjectivity in personality assessment, Donald Fiske (1978) had the following caveat for personality researchers,

There is empirical evidence (Kuncel, 1973; Minor & Fiske, 1976) indicating that observers responding to a statement about self or others draw on their memories in diverse ways and may make an interpretation of the statement that will facilitate their selection of a response. As inferred from observer's reports, the processes used in arriving at descriptions are frequently not those which the investigator intended the observers to follow. An investigator cannot assume that her observers perceive and interpret behavior as she herself does, or that their meanings for words and construct labels are the same as hers. And the greater the differences between the investigator and her observers, in prior experience and in subcultural or cultural memberships, the more probable are dissimilarities in processes of forming descriptions and in meanings for words and labels.
By introducing standardized and objective stimuli for subjects to compare themselves with, the similarity judgments should also be easier to make and less filled with evaluative undertones as in the Partridge case where, for instance, subjects were asked to compare their hostile self with their actual and ideal selves. For the subjects in that situation, there was nothing concrete with which to make the similarity comparisons, only a pejorative label to judge the salience of the stimulus to their own personality.

In the personality assessment methods I describe in the present studies, the self-stimulus is partitioned into two components -- the actual self and the ideal self -- so that I could obtain a discrepancy measure (the distance between them) to use as an alternative index of self-esteem, a concept first suggested by Rodgers & Dymond (1954). The idea is that people higher in self-esteem have better consolidated identities and thus less of a discrepancy between who they think they are and who they would like to become. Partridge (1984) found a modest relationship between self-esteem and error scores provided by MDS.

The MDS technique may provide a method for assessing the construct validity of available personality scales. One might argue that the validity of a measure corresponds to how close the scale scores come to predicting and classifying their namesake vignette (assessed by regression analysis). A simpler
index would be the correlation coefficient between subjects' distance functions from MDS with scale scores on the personality inventories.

As mentioned in an earlier section, MULTISCALE II produces some response style terms which reflect the manner in which the subject carries out the similarity judgments. One of these measures, the overall stimulus error, taps the consistency of the subject's judgments. Because this index may prove to have moderator influences on the positions of the actual and ideal selves as well as the other personality scores and because Partridge (1984) found some modest support for this notion with the construct of self-esteem, this index will be looked at as well. It is possible that subjects closer to the high-in-self-esteem prototypes (e.g., the dominant and Machiavellian characters) may have lower error scores.

Replicating the Partridge Findings

In developing the personality stimulus materials to be scaled by her subjects, Partridge (1984) used what might best be described as an "iterative" strategy. Through a set of pilot studies, she progressively optimized the test-taking characteristics and psychometric properties of a set of stimulus items designed to map the composition of the self-concept. Her final version of stimulus materials is shown in Table 2.

insert Table 2 about here
Table 2 reveals that the first four stimuli refer either directly to the global self (your "usual" and "ideal" self) or a subset of it (your "sexual" and "problem" self). The remaining eight stimuli are proposed self-referenced equivalents of corresponding interpersonal dimensions of the Wiggins (1979) circumplex (e.g., "your agreeable self" was adapted from Wiggins' "agreeable" trait dimension). For more information about the meaning and structure of these categories, see Wiggins & Broughton (1985a; 1985b).

Partridge makes a distinction between "subjective" and "objective" stimuli in Table 2. She referred to the first four as subjective and the remaining eight objective. Clearly the first four "selves" are subjective; only the subject has knowledge about them and their interrelations. The reasoning behind why the remaining eight are labelled objective goes something like this. Because the structure of the circumplex variables is as close to a replicable finding as one can get in the social sciences (i.e., it has been replicated many times and is linked to many classic studies) and thus can be said to be objective, so too should the structure of the "circumplex selves" be objective.

In Partridge's words, "objective stimuli are those stimuli that have a shared common value across a subject population" (1984, p.30), and she used some of the Wiggins' categories to form her objective stimuli. She argued that a well-defined
The fact that the proposed circumplex structure of the stimuli in Table 2 was not borne out in these data was interpreted by Partridge as having to do with the self-evaluative context of the MDS test. That is, when subjects are asked to self-reference the Wiggins trait categories (e.g., when "dominant" is changed to "Your dominant self" in the MDS similarity rating task), the semantic structure of the circumplex is overwhelmed by a bipolar dimension of evaluation, which accounts for most of the variance. The resulting pattern, see Figure 2, is based on two general clusters -- a good-self versus bad-self dichotomy.
As can be seen, the positive interpersonal stimuli form a cluster on the left of the plane, and the negative stimuli are on the right. In contrast, when the MDS task involved purely semantic processing of the Wiggins trait categories -- rating the similarity among trait stimuli without self referencing them -- an elliptical pattern of ordering was obtained.

These results strongly suggest that self-referenced stimuli such as those in Table 2 elicit evaluative responses which, with the aid of hindsight, seem like a reasonable thing for subjects to do. However, when subjects evaluate the stimuli without rating their own similarity to them, the circumplex structure, for the most part, is retained. What needs replicating is not the former finding, where the structure broke down, but the latter finding, where the known structure was preserved in the MDS testing situation. Thus in the studies to be outlined in what follows, an attempt will be made to test the "semantic" circumplex discovered in the Partridge data. Yet something extra is needed to improve upon the circumplex pattern when self-ratings are required. In an attempt to achieve this, subjects will be asked to compare themselves not to some idiosyncratic abstraction of their self-concept (e.g., whatever subjects individually decide what a "submissive self" is to represent for them) but to prototypical examples of the trait categories. This will allow for standard measures against which similarity ratings can be made.
Objectives

The following section summarizes, in point form, the propositions and hypotheses mentioned in previous sections which are tested in the present studies.

(1) MDS as a psychological assessment device can be improved upon by incorporating interpersonal prototypes (portrayed in vignette form) into the similarity ratings, thus standardizing the personality types against which subjects are to compare themselves. The degree of circumplexity of the MDS solution will serve as an index for instrument refinement. That is, the criterion used to measure improvement will be the "goodness-of-fit" of the MDS circumplex to the IAS (factor analytic) circumplex. To assess this fit, dimension weights from the MDS analysis will be standardized and projected onto the IAS space with the special principal component techniques developed by Phillips (1985). Two important indices used to evaluate the vignette stimuli will be their angle location and communalities.

(2) If the MDS measures are to find a place as valid measures of interpersonal traits, they will have to be shown to measure what established personality tests measure. The degree of match-up between the MDS and traditional measures will be mainly evaluated in terms of their pattern of intercorrelations. Four popular personality inventories will be used in these studies as a standard of comparison. These are: the Interpersonal Adjective Scales (Wiggins, 1979); the Personality Research Form (Jackson, 1974); the Adjective Check List (Gough & Heilbrun,
and the California Psychological Inventory (Gough, 1957).

(3) New substantive light can be shed on the difference between actual and ideal self since Euclidean distance can now be directly interpreted in two-dimensional interpersonal space. Hypotheses pertaining to the prediction of ideal self from actual self, and the distance between them, can now have added psychological meaning, i.e., the interpersonal category closest to the point of the ideal self shall define it; the distance between it and the actual self may indicate the likelihood of attaining it. In an attempt to establish the discrepancy between actual and ideal self as an accurate measure, the personality inventory scales and the MDS distance scores will be regressed on a rationally constructed self-esteem scale from the IAS 128 adjective item pool.

(4) MDS distance measures will also be evaluated for the degree to which they predict standard measures of dominance, perhaps the most widely studied personality trait that exists in the literature (e.g., Bakan, 1972; Buss & Craik, 1980; Butt & Fiske, 1969; Hogan, 1982; Leary, 1957). The comparative predictive validity of the MDS distances will be assessed across two methods -- IAS dominance and PRF dominance.

(5) Finally, it is expected that moderator effects, in the form of error term scores from MULTISCALE II, will show up in some of the trait categories, most likely in high self-esteem categories such as dominance and Machiavellianism since some support for
this process already exists (Partridge, 1984).

Study 1

This study constituted a first investigation of the structure of the eight vignette stimuli to emerge from an MDS analysis. Given the prototypical act content of the vignettes and the fact that the acts were based on the IAS circumplex model of interpersonal traits, the hypothesis for this study was that a circumplex structure would emerge from an MDS analysis of the eight vignettes.

Method

Subjects. Subjects for this study were 25 introductory psychology students (11 males and 14 females) who participated in this study in exchange for extra course credit.

Procedures. Eight vignettes were assembled from lists of 10 of the most prototypical acts from the analyses of Buss & Craik (1983). These lists of acts were generated and then calibrated for prototypicality empirically for eight trait categories sampled equidistantly around the Wiggins (1979) trait model. In constructing the vignettes, an attempt was made to stay as close as possible to the original acts from the Buss & Craik lists without adding much in the way of filler matter which might dilute the intended interpersonal message. Some dramatic license was taken, however, to mold them all into a realistic
story about a typical day in each character's life (see Appendix A).

Before participating, each subject completed a consent form. Following this the vignettes were randomly presented to each subject in a booklet and they were asked to take as much time as they needed to read and retain the eight vignette stories. Females read about females and males read about males but the acts were the same for each gender. Next in their booklet was a summary sheet which highlighted under each character's name the major events that transpired in each of the stories. The names chosen for the characters were ones deemed sufficiently androgynous (e.g., Pat and Gerry) to be the same for both sexes. Subjects were asked to refer back to either the summary sheet or the vignettes in the event they forgot a name or wanted to refresh their memory about one or more of the characters.

The next section of the booklet contained the similarity ratings. The instructions were as follows:

** SIMILARITY RATINGS **

Instructions:

Now that you have read about these 8 hypothetical characters, the next step is to rate them for similarity, two at a time until each one has been compared with all the rest. As you shall soon see, this is a very simple thing to do.

Example:

One of the similarity judgments that you will be asked to make is the following one:
If, after reading about these two people (there is a "summary sheet" to refresh your memory about them) you thought they were very similar, then you would circle the number "1". If you decided they were very different, then the number "9" would be appropriate. But if they seemed only moderately similar to you then you would probably circle the number "2", or perhaps "3", and so on for the rest of the scale.

Remember, there are no right or wrong answers here --- different people will judge these characters in different ways. Refer to the summary sheet as often as you like if you find that you can't remember what a particular character was like. If you prefer to re-read the original stories then please do.

One last important thing. Try to use the whole scale throughout this rating task. That is, don't always circle the same one, two, or three numbers for your answers. Try to use each of the 9 choices at some time or another, because you may realize after you have started, that you will need them all to best represent all of your similarity judgments. Think about the similarities or differences between each of the pairs and decide upon the number that best represents your decision. If you have any questions at any time please feel free to ask.

PLEASE BEGIN

As in the example in the above instructions, subjects completed similarity ratings for all nonredundant pairings of the eight vignette characters, for a total of 28 ratings.

Predictions for this study were (a) that subjects could assimilate and retain the vignette characters' personalities for future comparison; (b) that they could complete the whole rating task in 45 minutes or less; and (c) that a two-dimensional circumplex structure would emerge from a multidimensional
scaling of the similarity ratings.

Results and Discussion

The similarity ratings from Study 1 were subjected to a multidimensional scaling analysis using the program Multiscale II (Ramsey, 1980). After an initial analysis, two subjects were dropped from the sample on the basis of high error (exponent) scores. These subjects drastically violated the triangular inequality axiom which indicated gross inconsistencies in their comparisons. The final MDS analysis was performed on the remaining 23 subjects. Two and three dimensional solutions were requested. The three dimensional solution accounted for 92% of the variance -- 44%, 38%, and 10%, respectively.

As mentioned earlier, MULTISCALE was used in a confirmatory role to establish whether two dimensions accounted for the majority of the variance in the data. Since two dimensions did account for the lion's share of the variance, it was expected that they were the circumplex dimensions (love and status) that the vignettes were based upon. A plot of these dimensions confirmed these expectations.

insert Figure 3 about here

With the exception of two variables disrupting a clear circular pattern in the upper left quadrant, a circumplex
ordering of the vignette characters emerged from the data, as revealed in Figure 3.

In completing their similarity ratings, subjects did so in an average of 28 minutes and reported no difficulty in remembering the names of the characters and the behaviors they performed. They did report, however, that the summary sheet was necessary to achieve this, and most subjects on one or two occasions returned to the original vignette stories to refresh their memories.

Although a rough circumplex ordering of vignette characters emerged from a set of procedures that were easy to perform and complete in less than 45 minutes, it was also clear, however, that two problems remained. First, two of the vignettes in Quadrant II were too high in the space -- the two characters representing the traits of calculating and quarrelsome. Second, these two errant vignettes were too close together, suggesting that some closeness (or overlap) in meaning was present in the acts.

The results suggested that an attempt should be made in another study to shore up the circumplex structure of the eight vignettes by addressing both of these problems. The first problem may clear up by simply reducing the intensity of the two defining dimensions of love and status in the vignettes tapping the traits of calculating and quarrelsome. This could be accomplished by rating the acts for intensity on the dimensions of dominance and nurturance and then selecting ones less extreme on the dominance dimension. As for the second location problem,
a reexamination of the Buss & Craik act lists, in the light of newly reported characteristics of the acts, was necessary. In a personal communication (September, 1985), Buss reported that when acts were sorted for prototypicality for all of the eight trait categories simultaneously (instead of one at a time), it was revealed that some highly prototypical acts turned up in more than one category. And this was especially true for dominant, calculating, and quarrelsome acts. In other words, some apparently "good" acts carried ambiguous messages as to where they belonged. One such example was the prototypically quarrelsome act "I criticized my partner's choice of clothes" which also turned out to be highly dominant as well. In summary, the results of Study 1 may be interpreted as at least partially the result of the inclusion of confusing and ambiguous acts in the troublesome vignettes representing the upper left quadrant. It could also be the case that the extremeness of the acts caused aberrations in the upper left quadrant (quadrant II). The location of the vignettes appearing in the far upper reaches of quadrant II suggested that the acts needed to be toned down in terms of the dominance and hostility they expressed.

Study 2

The purpose of this study was to attempt a reparation of the calculating and quarrelsome vignettes by adjusting their act composition in two ways. First, on the basis of a newly
reported redundancy index for the prototypical acts, an attempt was made to reduce the ambiguity of the acts in the vignettes by including only acts that were prototypical for one category. Second, by incorporating new acts that possess less intensity in terms of how much dominance and hostility they contain, an attempt was made to alter their position in interpersonal space. The intensity of the vignettes was assessed by judges familiar with the circumplex system. The hypothesis for this study was that the vignette characters from quadrant II would be seen to vary in dominance and quarrelsomeness depending on the distinctiveness and intensity of the acts they performed.

Method

Judges. The subjects for this study were 15 graduate students in psychology enrolled at UBC who had recently taken a graduate course in personality psychology in which circumplex models of personality assessment had been covered. Each subject volunteered to judge six vignettes on the basis of how much dominance and hostility were expressed in their content.

Procedure. Two ten-place unipolar Likert scales were used by the judges to rate each vignette. One was anchored by the adjectives "dominant", "assertive", and "forceful", and the other dimension was anchored by "cold", "iron-hearted", and "uncharitable". These adjectives were selected from Wiggins Interpersonal Adjective Scales (1979) on the basis of their high communalities on one of the two defining dimensions of love and status. The judges were instructed to read six vignettes about
two hypothetical people (three per trait of calculating and hostility). The instructions they read were as follows:

**VIGNETTE RATINGS**

**Directions**

Enclosed you will find two sets of short vignettes (or stories), each set describing one hypothetical person, either "Robert" or "Sam." There are three vignettes describing the behavior of Robert, and three vignettes describing the behavior of Sam. You will also find six rating forms to use to rate each vignette (all of the rating forms are identical).

Read all three of the vignettes about the first person that appears in this booklet before you start rating, to get an understanding of how they differ from each other. Then rate each vignette separately on the two scales provided (dominance and coldness). Please write the name of the vignette you are rating in the space provided (the last name initial is different for all of them, so please include it). Also, put your assigned number on each of the rating forms so I can keep them all together. Repeat this procedure for the second set. Thank you very much for your help.

Your number is: ____

**Results and Discussion**

The results of Study 2 are shown in Table 3. By varying the

insert Table 3 about here

acts performed by the vignette characters in terms of dominance and coldness, vignettes of varying intensity and greater distinctiveness were produced. Significant differences were found between the scale means for the three versions of each
vignette (all t ≥ 1.96). Vignette A represents the original vignette used in Study 1, while vignettes B and C for each of the trait categories, were the newer versions. From this analysis it was clear that version C for each category should be used in any further MDS studies. Note that the true test of their "significance", however, would have to wait for a later MDS analysis. It was hoped that differences in their locations in MDS two-dimensional space would be commensurate with their mean differences here.

Study 3

The two preceding studies have paved the way for a microcomputer administration of the MDS similarity rating task using the final set of vignettes. This procedure differed from Study 1 in that subjects were also asked to compare themselves to the eight vignette characters. In addition, subjects were required to pass a memory test of name/behavior pairs to ensure they had encoded the characters properly before they could proceed to the similarity ratings. It was hypothesized that the addition of the improved vignettes from Study 2 would improve the circular structure of the resulting MDS plot of the stimuli (this was first tested with the initial 25 subjects).

The MDS similarity ratings of self and others were seen to be closer measures of people’s cognitive structures or schemas than traditional trait ratings. Thus a second hypothesis in this study was that MDS distance scores would measure
personality traits as well, if not better, than traditional inventories.

Another issue addressed in this study had to do with the "predictive effectiveness" (Burisch, 1984) of the MDS measures. That is, how well do all the MDS distance measures predict important personality dimensions as compared to traditional measures. The third hypothesis, then, was that the nine MDS distance measures, taken as a battery, would predict IAS self-esteem and dominance scores better than the traditional personality inventories used in this study (CPI, PRF, ACL, and IAS).

Method

Subjects. A total of 158 subjects were solicited from UBC lecture halls, mostly students enrolled in Introductory Psychology. An attempt was made to obtain an equal balance of males and females -- the result was 77 and 81 respectively. All subjects received extra course credit for their participation in this study, as well as feedback in the form of personality test results.

Personality Measures. Subjects were administered multiscale personality inventories on two occasions; the first a self-administered interactive session carried out on a microcomputer, and the second a take-home session where subjects were asked to fill out a package of conventional personality measures at home following the first session. Most subjects returned the take-home package within two days. The measures in each of the
sessions are described separately below.

Session I. 1. **MDS of the DIstance to the Interpersonal PROtotypes (DISPRO).** Designed as a computerized, self-administering program to plot individuals in "interpersonal space", DISPRO (Broughton, 1985) combines multidimensional scaling techniques from MULTISCALE II (Ramsey, 1980) with the development of prototypical characters as interpersonal stimuli described earlier. Subjects begin DISPRO by reading a one page, "day-in-the-life" story (vignette) of a hypothetical character who displays prototypical behaviors from one of eight interpersonal categories from the Wiggins (1979) circumplex. Following this the subject is asked to rate the similarity of the same-sex hypothetical character to him or herself on an eight-place Likert format scale ranging from not at all similar to extremely similar. This process is repeated for each of eight prototypical characters sampled equidistantly (and randomly) around the Wiggins circumplex. To ensure that the subject remembers the behaviors performed by the eight characters and that the right behaviors are associated with the right vignette character, before the subject proceeds to make the next set of ratings, lists of "act summaries" under each of the eight vignette characters' names are displayed on the screen as an encapsulated review of what the subject read earlier. Because only names are used in the similarity ratings, it is crucial that the subjects know which name corresponds with which set of behaviors. Thus to ensure that subjects have coded the characters correctly, after regarding the vignettes, the
computer administers a simple memory quiz to be completed successfully before they can continue. It is required that four correct character-to-act associations be made before the computer allows the task to proceed. To do this, the computer picks a random act from the eight vignettes; the subject has to correctly identify which vignette it came from. When an incorrect choice is made the correct choice is displayed along with the vignette from which it was selected. If more than two errors are made, the subject reviews all the act summaries and the memory test is repeated. When the computer receives four consecutively correct answers, the subject proceeds to the final set of ratings.

After the subject completes the memory test, the next section requires that all possible pairs of eight vignette characters and the subject’s “ideal self” (the person he or she would most like to become) be compared for similarity, thus a total of 45 ratings are to be made in this section.

**Session II. 1. Interpersonal Adjective Scales (IAS).** One of the paper-and-pencil tests in the subject’s take-home packet was the IAS (Wiggins, 1979), composed of 16 eight-item single adjective scales. In completing the IAS, subjects rate the accuracy with which each of the total 128 adjectives describes them on an eight-place scale. A glossary accompanies the IAS since some of the adjectives (e.g., unwily) are negation terms and are likely to require definition. The IAS self-report measure was selected to assess personality in terms of interpersonal variables with known structural (circumplex)
properties organized around the coordinates of dominance and nurturance (see pp. 13-16 of this thesis for more details). When these 16 scales are combined into octants, they provide the clearest circumplex structure that has been published to date (Wiggins, Steiger, & Gaelick, 1981). More recently, however, in an unpublished article, Wiggins, Phillips, & Trapnell (1986) have revised the IAS scales and improved upon their circumplex properties. Because of this, these newer scales (IAS-R) were used in this study. As in Study 1, the IAS will provide the structural markers with which to assess the validity of the multidimensional scaling task described next.

2. California Personality Inventory (CPI). Perhaps the most popular of personality tests for normal populations, the 480 true-false item CPI (Gough, 1957) is composed of 18 scales developed to represent and measure descriptive, "folk" concepts of personality (e.g., "sense of well-being") that possess broad personal and social relevance to human behavior. Emphasis was placed on tapping concepts related to the favourable and positive aspects of personality rather than the abnormal and pathological that instruments such as the Minnesota Multiphasic Personality Inventory were designed to measure. All of the scales were developed mainly with empirical techniques. Fourteen were developed solely with this method and the remaining four were developed with a mixed empirical/rational strategy that involved item selection based partly on the test developer's judgment as to which items were to be included in a scale. The final judgment in all cases, however, was made on
the basis of empirical, non-test relations between a given scale score and a criterion measure (e.g., peer ratings). The resulting scales were: dominance, capacity for status, sociability, social presence, self-acceptance, sense of well-being, responsibility, socialization, self-control, tolerance, good impression, communality, achievement via conformance, achievement via independence, intellectual efficiency, psychological-mindedness, flexibility, and femininity.

3. **Personality Research Form (PRF).** The PRF, developed by Jackson (1970), has been hailed by one reviewer as the "best example of a large-scale personality inventory ... whose development was guided explicitly by the substantive, structural, and external considerations of the construct point of view" (Wiggins, 1973, p.409). The construct point of view in test construction (Loevinger, 1957), involves the use of carefully explicated psychological theory wedded with psychometric considerations (scale homogeneity, etc.) and the criteria of convergent and discriminant validity. Jackson chose his personality variables on the basis of Murray's (1938) theory of personality. The 300 item true/false format PRF is composed of the following 20 Murray "need" (or trait) scales: abasement, achievement, affiliation, aggression, autonomy, change, cognitive structure, defenestration, dominance, endurance, exhibition, harmavoidance, impulsivity, nurturance, order, play, sentience, social recognition, succorance, and understanding.

4. **Adjective Check List (ACL).** Originally used as a
technique for observers to describe others at the Institute of Personality Assessment and Research in Berkeley in the early fifties, the ACL (Gough & Heilbrun, 1965, 1980) in its current form as a self-report personality instrument, has become the most widely used personality inventory for normal populations. A main reason for this is because of its ease of use and comprehensiveness. As the name informs, the ACL is composed of (300) adjective items, e.g., "organized", "suspicious", from which a respondent indicates those that are self-descriptive with an "X". In 1949, adjectives were selected for the ACL which were thought to be essential for describing personality from most of the theoretical vantage points that were available at the time (e.g., Freud, Jung, Murray, etc.). In 1958 Heilbrun developed 15 scales from the ACL item pool specifically constructed to represent dispositions from Murray's (1938) need-trait system. Particular dispositions were selected on the basis of their relevance to observable behavior in normal human functioning. The Murray scales are: dominance, nurturance, affiliation, exhibition, aggression, succorance, deference, order, intraception, succorance, heterosexuality, achievement, change, endurance, and autonomy. The remaining five were constructed according to empirical methods: number of adjectives checked, self-confidence, self-control, lability, and personal adjustment.

Method of Analysis

Data obtained from Sessions I & II were analyzed in the foll-
owing way. First, circumplexity tests for the entire sample were performed on the IAS data. These included principal component analysis of the eight IAS scales corresponding to the traits of the vignette characters and a subsequent plotting of scale loadings on the defining factors of dominance and nurturance. As has been found in many samples similar to the one to be used in this study, a clear circular structure with scales plotted almost equidistant around the periphery of the circle, was expected. It is important that a clear circumplex structure emerges from the IAS data. If the structure was poor, it could call into question how seriously all of the take-home materials were viewed by the subjects.

The data obtained from the similarity ratings of DISPRO were analyzed in two ways; for the entire sample and for individuals. First, the similarity ratings from the entire sample were analyzed using MULTISCALE II with a two-dimensional individual differences model. For each of the stimuli (8 characters plus actual and ideal selves) the MDS program is used to help construct a configuration of points in Euclidean space such that the distance relations among them correspond as closely as possible to the judged dissimilarities in the data. This is achieved through an iterative process of successive alignment where MDS algorithms (which in this case was the aforementioned individual differences model from MULTISCALE II) are applied to determine a set of coordinates that maximize the "goodness-of-fit" between the data and the model. In an individual differences model, each subject's ratings are treated
as a replication, the end result producing a group solution that also retains each subject's dimension weights. Dimension weights (or dimensional saliences as they are sometimes referred to) are measures of the importance ascribed to the dimensions by each subject. While some MDS models incorporate a least squares criterion for fitting the model to the data (e.g., INDSCAL) and others employ a maximum likelihood criterion which choose coordinates that are most likely to give rise to the observed dissimilarities (e.g., MULTISCALE II), the two criterion procedures more often than not lead to the same solutions (Schiffman et al., 1981).

The output from the MDS analysis will provide a two-dimensional plotting of the eight vignette characters, the average subject (self) in relation to these characters, and the location of the average Ideal Self, for a total of ten points plotted. Likewise for individual plots, it was possible (indeed very easy) to determine (1) which of the vignette characters that a subject's actual self most resembles, (2) which one is most similar to what the subject aspires to become (the ideal self), and (3) the amount of difference between the actual and the ideal self (a self-esteem estimate). In addition to this, MULTISCALE provides three important indices to help interpret the way the subjects treated the task they were confronted with (these are response style measures). As discussed elsewhere in this thesis (pp. 12-13), these indices -- the overall stimulus error term, the individual stimulus error term, and the "exponent" -- when taken together essentially provide a measure
of subjects' consistency in making the ratings and how differentiated they were in making discriminations among the stimuli. Thus if a subject did not take the task very seriously, this would be reflected in these scores. Also, as potential individual difference measures in their own right, these indices may receive additional interpretive significance in terms of their relation to other personality variables. They may even turn out to possess moderator influences on other variables since Partridge (1984) found modest support for this. There will be more on this in a later section. Analyses carried out on individual subjects were also performed on the sample as a whole.

Next, circumplexity from the whole sample solution from MULTISCALE II were analyzed by comparing the norms and adopting the procedures provided by Wiggins, Phillips & Trapnell (1986). This was followed by (1) zero-order correlational analysis of the four personality inventories and dimension weights (hereafter referred to as distance scores) computed in MULTISCALE II, including actual and ideal-self scores, (2) descriptive analysis of MDS profiles according to angular placement on the IAS with software developed by Phillips (1985), and (3) a study of the moderator effects of the response style indices produced by MULTISCALE II, e.g., whether the error terms provided by the program were lower for dominant subjects, etc.

Data obtained from the take-home package of materials were also analyzed with the distance scores to assess the predictability of two dispositional criterion measures --
self-esteem and dominance. The self-esteem criterion was developed rationally from the 128 adjective item pool of the IAS. The items, the first two keyed positively and last three reversed, were: self-assured, self-confident, self-doubting, self-effacing, and unauthoritative. These items were combined into a self-esteem scale score for all of the subjects. For dominance there were two criterion measures -- IAS dominance and PRF dominance -- representing two methods (Likert scale adjectives and true/false propositions, respectively).

The regression analyses were performed according to the suggestion of Nunnally (1978, p. 180) that all scale scores be forced into the equations (to minimize the advantage that large inventories have over small ones in stepwise procedures). These regression analyses were used to determine the extent to which the four inventories could predict distance from the prototypes (vignettes), again, including the self-esteem discrepancy measure.

Results and Discussion

The take-home IAS data produced a remarkable circumplex structure that rivaled the best that have been obtained in the Laboratory. As we have seen earlier, the results of a principal axes factor analysis are best revealed in a plot of the first two factors. Although numerous UBC and other samples have taken much

insert Figure 4 about here
of the guess work out of these analyses, it was questionable as to whether the take-home package would be completed seriously by the subjects. Figure 4 laid to rest any doubts I may have had about a take-home IAS, and shored up my confidence in the rest of the materials the subjects completed at home. Since the IAS was chosen in this study to provide the structural (and validational) criterion with which to evaluate the MDS analyses, a shoddy circumplex would have called into question the rest of the data, perhaps even unfairly. The two circumplex dimensions accounted for 73% of the variance (40% and 33% respectively), which is slightly above the average in university samples.

What was to be more of a mystery was whether a satisfactory circumplex structure would prevail in the MDS analyses with the two new vignettes (calculating & quarrelsome) affecting the structure. Actually, the mystery was softened somewhat when I checked the structure after 25 new subjects completed the DISPRO procedures. The structure was not perfect, nor was it expected to be, but it was a definite improvement over the original vignettes used in Study 1.

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insert Figure 5 about here

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Figure 5 presents an MDS plot of the first two dimensions
based on 150 of the 158 subjects (eight were dropped due to high error scores). This structure was obtained without the self variables (usual and ideal) in the analysis. Clearly, by just looking at the solution in Figure 5, the addition of two new vignettes in the upper left quadrant represents a qualitative improvement over that of Figure 3 from Study 1. The true test, however, was still to come. The best way to evaluate the circumplexity of the MDS distance measures is to project them onto the IAS two-dimensional space using the principal component analysis software developed by Phillips (1985), which he calls a "circumplex generator/analyzer". Although method variance plays a distorting role in the estimated communalities (sums of the squared loadings on the two dimensions) that are computed in the program, and this is especially true when two methods vary widely, as in this case, the program also provides angle locations and other indices which are not affected by this. That is, when high method variance exists between two instruments, then the one that is projected onto the other will not load as highly on the defining dimensions. The graphic outcome of high method variance is that the IAS variables typically overwhelm the solution and force other variables to the center region of the two-dimensional space. If any structure remains in the non-IAS variables then this is a tribute to their durability under trying conditions. Nevertheless, angle locations are the same regardless of communality since angles are calculated from the origin of the circle. Thus with angle locations of variables one can
determine whether they are located in the proper octant of the interpersonal circle. Congruence between an ideal IAS circle (with zero degrees at the location of nurturance, and dominance at 90 degrees, etc.) and other interpersonal variables can be evaluated in terms of the degree of alignment between the two. Appendix C contains the output from this analysis in the present study. In summary, the results confirmed the circular structure of the MDS distance measures. The angle locations of these measures were all where one would expect them to be if a circumplex structure prevailed. The average deviation from the ideal angle placements for the distance measures was 24 degrees, with a standard deviation of 16.2. The range of deviations was from 1 to 53 degrees. Another way to look at these findings is to compare the angles of the DISPRO measures with the angles of the IAS variables. For example, distance from the Submissive vignette variable should appear in the dominant section of the circle (from 70 to 110 degrees) since distance from a vignette and its corresponding IAS score are negatively correlated. In other words, long distance (or high dissimilarity) from, say, the Submissive vignette character, should correspond in angular location with high IAS Dominance scores if there is interpersonal congruence between the two. This was exactly what happened. From this sample, IAS Dominance was positioned at 83.2 degrees on the Interpersonal Circle. Distance from the Submissive vignette appeared at 105.6 degrees. All of the distance measures turned up in the appropriate segment of the interpersonal circle and, on average, the difference between the
placement of IAS scales and the corresponding distance measures was only 15 degrees. Even taking into account the large amount of method variance in these methods, the distance measures still formed a quasi circle within the IAS circle at the perimeter.

It is interesting to note what happens when the tables are turned and the IAS variables are projected onto the DISPRO variables. It is interesting that the exact opposite juxtaposition of the two sets of variables occurs. The DISPRO variables form a near perfect circle at the edges of the space while the IAS variables form a rough circle around the origin (see Appendix C). Yet almost the same angle locations are found for the two sets of variables as were found in the first analysis. One can conclude from this that both sets of variables possess circular properties. A solution involving both sets at the same time, however, depends on which set initializes the space.

In terms of other criteria for evaluating circumplexity in these data, the proportion of variance accounted for by the first two factors was a very healthy 72.42% (41.8 and 30.6% respectively). The difference between the first two factors was only 11.2% and the third factor accounted for less than 8% of the total variance. These findings clearly establish the vignette variables in circular interpersonal space — the major circumplex criteria, as outlined by Wiggins, Steiger & Gaelick (1981), were met.

Figure 6 displays the result of what happened when the average usual and ideal self were added to the solution. The
average usual self lies closest to the vignette constructed to mark the grgarious-extraverted trait from the Wiggins circumplex. The average ideal self lies closest to the vignette constructed to mark the warm-agreeable trait. Given the high social desirability of these two traits, it is not surprising that the average subject aligns her or his “selves” in this way. What did surprise me, however, was the distance between these selves and the circumplex solution of the vignettes. The message seems to be that the average subject chooses to distance him or herself quite far away from all of the vignette characters. This may reflect in part the fact that all of these characters are not very desirable people, due perhaps to the clear-cut one-sidedness of their characters. I will have more to say on this later. The next step was to observe the congruence of the vignette assessment materials with the traditional measures.

Tables 4 through 7 reveal the remaining major findings of this study. The zero-order correlations contained in Table 4 tell us

much about the results of this research programme vis-a-vis
traditional approaches. First and foremost, the overall magnitude of the correlations between the two domains are lower than I had expected. This reflects on the linkage between the DISPRO assessment paradigm in its current form and the traditional paper-and-pencil personality measures used in this study. Although many of the coefficients that were expected to be high on theoretical grounds (e.g., IAS Dominant scale scores with distances from the Submissive vignette) were moderately high, or just significant, or at least in the right direction, there were surprisingly more of the last than the first. The IAS scales did substantially better than the other inventories; a salutary finding given the special circumplex nature of these scales and the vignette characters that were modelled after them. The IAS had 74% of its coefficients reach significance at the .05 level or better with a highest coefficient of -.38 with the self-esteem discrepancy measure.

The PRF and ACL personality inventories were tied for second in terms of the magnitude of the correlations with the vignette distances. Each of these tests had a coefficient in the low thirties, in each case with the self-esteem measure. The CPI, on the other hand, came in fourth place on this index with its highest coefficient (-.25) found in both the dominant vignette and self-esteem measure. But the CPI had 22% of its coefficients in the significant category with the ACL and PRF placing 17% and 14% respectively. One way to interpret these significant coefficients is to observe the number of "stray shots" that appear, a term used by Burisch (1984) to refer to
the notion that we should not look approvingly at a significant correlation if the wrong constructs match up. For instance in Table 4, PRF Aggression correlates virtually the same with vignette dominance as PRF dominance does. Burisch's point is that one should not count both as "hits" in one's evaluation, only the latter one should count. From this perspective then, the IAS clearly scores high in the least amount of stray shots. Most of the significant correlations with the other inventories, however, were not stray shots either. The coefficients that appear underlined in Table 4 represent appropriate "hits", in Burisch's (1984) terminology. The average (Fisher transformed) hit for the IAS was (in absolute value) .23; the PRF .19; and both the ACL and CPI have .18. I expected the CPI to fare the lowest on these measures since it is the least "interpersonal" of the four inventories in terms of its scale coverage.

The fact that the highest set of DISPRO correlations was found with the IAS variables may at first seem contrary to what one would expect given other related findings from Buss and Craik (1980). For instance, these authors found that when they combined self-reported prototypical acts into what they termed "multiple act criteria", the highest correlations with personality inventories were found with the PRF and not the IAS. But the methods in the present studies were really quite different from those used in the Buss & Craik studies. Subjects in my studies were asked to form impressions of the vignette characters after reading about their typical behaviors. Later they compared themselves to the vignette characters on the basis
of these impressions when they carried out the similarity ratings. The present findings seem quite congruent with the notion of "spontaneous trait inference" (cf. Winter & Uleman, 1984; and Basili & Smith, 1986). Briefly, these authors found that people code specific behaviors with trait labels, e.g., extraverted, and use the trait labels to help recall the original behaviors. Their findings seem to fit well with what has been found here. The IAS trait labels correlate higher than behavior-like items in the PRF.

Interestingly, most of the highest coefficients obtained from all of the four inventories were obtained with the self-esteem discrepancy measure. The highest correlation of them all came from the IAS dominance scale reported above (-.38). This may shed some new light on the meaning of self-esteem as partly explained by the amount of interpersonal distance between our actual and ideal selves.

Results from the regression analyses begin with Table 5. In

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insert Table 5 about here
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the first analysis, a specially constructed self-esteem scale was used as the criterion measure. The predictors were the distance measures and inventory scales. Since multiple Rs are known to be unstable and often capitalize on error variance in uncross-validated data, R squared was used here as a less biased estimate. And as a further safeguard, the Olkin & Pratt
(1958) correction formula was applied as well to compensate for differences in sample size and number of predictors to select from in each inventory. Even with all these precautions in place, as Nunnally (1978) points out, unless you have more than 500 subjects, even with a correction applied to R squared, the equation will still tend to overcapitalize on the chance relations present in the data.

With these cautions in mind, refer to the second column in Table 5 which contains the adjusted R squares. The original multiple Rs are beside them. Although all predictors were strongly related to the self-esteem criterion, the DISPRO distances, with the discrepancy measure given the most weight in the equation, outperformed the others. The DISPRO discrepancy measure of self-esteem is thus (at the very least) a relevant index of an IAS measure of this construct. This finding also lends support to the Rodgers and Dymond notion that a measure of disparity between actual and ideal-self is a useful conceptualization of self-esteem. Summary tables for these and other regression analyses are contained in Appendix D.

The next analysis was a test of the predictability of IAS Dominance by measures that did not share the adjective format of the IAS. Those that did (the ACL and remaining IAS scales) were used in a regression analysis with PRF Dominance as the criterion measure. Taken together these two analyses were to provide an indication of the comparative predictive validity of the DISPRO measures across two methods. Table 6 contains the findings of the first analysis with IAS Dominance.
The **uncorrected** regression coefficients are virtually identical for the three predictor measures while the adjusted $R$ squared column shows that a slight predictive margin exists with the DISPRO predictors. Again, the DISPRO personality assessment technique appears to fit in very well with the traditional measures in predicting the fundamental personality trait of dominance, one of the two defining dimensions of the circumplex system.

An inspection of Table 7 reveals that DISPRO measures did not fare as well in predicting the PRF form of dominance as they did with IAS Dominance. The ACL and IAS scales placed a close first and second quite far ahead of DISPRO predictors.

A few indices that were expected to show positive results but **did not**, in this study were the moderator variables, or error terms, supplied by Multiscale II that Partridge (1984) found some modest support for. In this study there was no relation between these error and consistency terms and the many personality measures employed in this study. Thus the future does not bode well for these indices as moderators of
personality. It was true, however, that by removing the small proportion of subjects who had extreme error terms, that the circumplex structure of the distance variables was greatly enhanced. It is also true that normal data cleansing techniques would have identified them as well.

General Discussion

Taken as a whole, the results of these studies are generally consistent with the logic that led to their inception. In summary, the DISPRO measures were found to conform to circumplex structural criteria, that is, form a never ending circle of intercorrelated variables in two dimensional interpersonal space. The degree of congruence between the DISPRO and traditional measures, as indicated in their pattern of intercorrelations, showed a consistent alignment between the two domains. The MDS distance measures were able to predict IAS Self-esteem and Dominance scales better than the other three inventories. A new discrepancy measure of self-esteem has shown promise as an operationalization of Rodgers & Dymond's (1958) notion of degree of congruence between ideal and usual-self.

These findings have wider implications for personality psychology than have been discussed thus far in this dissertation. To move beyond what has already been covered, I have selected three major themes in personality psychology from which to consider the broader implications of this line of research, namely (1) the construct validity of DISPRO; (2) a
reconsideration of the value of the concept of prototype in this assessment context; and (3) the unique properties of DISPRO as personality assessment technique that may move the field of personality assessment closer to the actual processes involved in the social perception of others. I will address each of these areas in turn in what follows.

Construct validity of DISPRO

Of primary concern in the development of new methods of personality assessment is determining their construct validity (Loevinger, 1957; Wiggins, 1973). Establishing construct validity involves an evaluation of the accuracy with which the hypothetical concepts a test is purported to measure, are actually measured. Loevinger (1957) has outlined three aspects of construct validity which correspond to the stages of development of a good personality test. I will discuss these in terms of the development of the DISPRO testing procedures.

First, according to Loevinger, the selection of items for inclusion in a new test must follow explicit substantive (theoretical) considerations. In other words, one must sample items systematically from a specified universe of content of items made salient by theoretical propositions. The DISPRO procedures are indirectly linked to the IAS model of personality measurement and the theoretical position from which it was developed. The development and scaling of the hypothetical DISPRO characters were based on the prototypical act lists
borrowed from Buss & Craik (1983), which in turn were selected to represent interpersonal variables from the IAS trait model. In what was covered earlier, it was shown that the development of the IAS (Wiggins, 1979) was guided intensively by substantive criteria, particularly by the interpersonal theory of Harry Stack Sullivan (1953).

Loevinger's second criterion for construct validation has to do with the structural relations that determine the goodness-of-fit of the measurement model to its substantive domain. Structural fidelity then, is determined in this case by the match-up between the DISPRO model and the interpersonal circle it is purported to represent. As Wiggins (1973) states, "structural characteristics of nontest manifestations of the trait(s) should be faithfully mirrored in the structural characteristics of the scale employed to measure the trait(s)" (p.405). In the findings of these studies, the degree of match-up between the IAS circumplex model of traits and the DISPRO circumplex was very good. The pattern of correlations between the two forms of measurement was what one would expect if there was high congruence between them.

Earlier I made reference to some of the studies that have shown nontest correlates of the IAS with interpersonal behavior (e.g., Chartier, 1984; Clark, 1984). Any measurement system worthy of merit must be shown to possess a high degree of such external validity, the third criterion from Loevinger's (1957) list. Although prediction of behavior is the ultimate goal of any assessment model, an equally important consideration is the
establishment of convergent validity (Campbell & Fiske, 1959) with other measures that have been validated in that way. If a new measure can be shown to predict another that has known nontest relationships with important social criteria, then a powerful case has been made for the external validity of the new measure as well. Thus the magnitude of the correlation of a new measure with some important outside measure, such as the IAS, is an important index of utility. In addition, to demonstrate full construct validity of a measure it is required that irrelevant trait measures from independent sources be uncorrelated with the measures from the new method. This index, termed discriminant validity by Campbell & Fiske (1959), is said to exist when one measure of, say, dominance is shown to be uncorrelated with an independent (and theoretically irrelevant) measure of, say, hostility. For the most part, the pattern of relationships between the DISPRO and other measures used in these studies was consistent with the standards of convergent and discriminant validity that were set by Campbell & Fiske in 1959. And from the broader perspective of Loevinger's (1957) notion of construct validity, including the three important criteria of substantive, structural, and external considerations, the DISPRO procedures have been clearly established.

Prototypes revisited

A groundswell of evidence in support of the use of the concept of prototype in personality psychology has been building
for some time now, best evidenced perhaps with the Psychological Review article by Buss & Craik (1984). Some of my own earlier work (Broughton, 1984) has contributed to the evidence that prototypes provide a useful organizational framework for the development of improved predictor variables in personality assessment. The contribution of the present studies, however, can reside in either of the predictor/criterion camps, although emphasis has clearly been placed on the DISPRO procedures as valid predictor variables. To establish their convergent validity, it was necessary to use the MDS measures as self-report predictor variables. However, as has already been shown when the MDS measure provided the structure for the IAS to be projected onto, when the emphasis is switched from predictor to criterion, the prototype technology may take on added usefulness. This may be further illustrated with some concluding comments on the ideas of Fiske (1971) mentioned earlier.

Recall for a moment Fiske's plea to researchers in personality psychology to deal with the inherent subjectivity of meaning in the tests and stimuli they present to their subjects (discussed on pp. 26-27 of this thesis). Fiske proposed that researchers focus on more precise behaviors and physiological measures (e.g., bodily movements and heartrate) rather than words and phrases that give rise to idiosyncratic interpretations by subjects. One workable answer seems to lie in the standardization of trait concepts that is accomplished by adopting a prototype approach. Creating reliable stimuli by
combining prototypical acts into a day in the life of a set of hypothetical characters and then asking subjects to compare themselves in an MDS similarity rating task seems to be a big step in this direction. Results of the present studies lead me to suggest that it is now possible to build assessment devices that meet Fiske's criteria. Moreover, the processes invoked by subjects to code the prototype stimuli may closely approximate the cognitive processes which mediate actual social perception in everyday life. This point has to do with the notion of schema and how the concept of similarity-to-the-prototype might mirror the organizational processes that are used to structure mental representations of significant others in our lives. As Jones (1983) has stated, MDS similarity judgments, involving self and others are essentially similar to the processes typically evoked in actual social situations involving two or more group members.

The current popularity of topics of schema and prototype in personality psychology reflect the cognitive revolution that has characterized psychology in general. The concept of person schemas or person prototypes was first employed in the understanding of dispositional constructs by Cantor and Mischel (1979). Not only did these authors find evidence that people code others in systematic and similar ways (e.g., subjects had similar "extraverted person schemas") but that these person categories, as with natural Roschian categories, were organized like fuzzy sets with exemplars or prototypical cases defining the core of each disposition. More agreement among subjects was
found for person types that represented clear case examples of a dispositional category. In a related study, Mischel & Peake (1982) found that subjects coded others personality in trait terms on the basis of prototypical behaviors they performed. Their subjects generalized the traits they had coded for others to different situations even if there weren’t warranted in doing so, that is, when the evidence was otherwise. These findings are in line with studies showing evidence for "spontaneous trait inference" (Winter & Uleman, 1984), mentioned earlier in this thesis. People seem to code the behaviors of others in terms of the best trait descriptors that are available and use them for later recall. Perhaps the upshot of these last two studies is that the more prototypical the behaviors are, the faster and easier this encoding process occurs. An empirical test of this hypothesis would add to our understanding of these important processes.

In many instances the concept of prototype has been well-received in personality psychology. The present studies serve to strongly reinforce their usefulness as well. By spelling out the behavioral components of what is meant by a trait category in a short story about one central character, there is no ambiguity as to how one respondent’s interpretation will compare with another’s -- they both have the same information to go on. The result is a clear and standardized metric for self-comparison.

**DISPRO as personality assessment technique**

Although many of the features of DISPRO as a personality
assessment device have been mentioned at some point or another in this dissertation, it will be useful to summarize these here and make some concluding remarks about its significance as an assessment device in its own right. There are three aspects of MDS that I would like to cover here. First, the ease of use for the test-taker can not be overemphasized. This, of course, does not have as much to do with the computational aspect of MDS as it does with the subject's perception of the task she or he is confronted with. The task is viewed as simple and non-threatening. And very little instruction is necessary for subjects to carry out the similarity ratings. It came as a surprise to me, for instance, when I discovered it was not necessary to explain to subjects what the criteria were for them to go about making these similarity ratings. As Schiffman, Reynolds, and Young (1981) have reported in their many experiences with subjects using similarity ratings, experimenters need not worry about such things. Subjects have no difficulty deciding on what basis to decide on the similarity present in stimuli, and that if the stimuli are nonambiguous to begin with, they do so with very high agreement. The point that I have repeatedly made and will make one last time, is that in MDS the experimenter does not "contaminate" the subjects with a set of predetermined responses for them to choose from. The whole testing process is thus more closely determined by the properties present or not present in the stimuli, which is, of course, the reason for testing in the first place -- to learn something about the interaction of stimuli and subject(s).
The second aspect of MDS worth mentioning here has to do with a related point made in the previous section on the usefulness of prototypes in personality assessment. The point is that the psychological concept of similarity fits well with one's individual appraisal of self and others. Thus to ask someone to compare themselves to another person is to ask them to do something that they do on a regular basis. Again, the subject decides on what basis the judgment should be made. On the other hand, filling out standard paper-and-pencil personality tests, where individuals are asked to judge how much of a foreign substance (e.g., "spinelessness") they possess, is a very unnatural thing to do. It is something people seldom do outside of psychology experiments and courses.

The last aspect of the MDS testing process that is worth added emphasis is the built-in error detection features that are a part of the MDS procedure. These error terms, e.g., the exponent, are not affected by the properties of the stimuli or methods of the test as are standard measures in traditional personality tests. In other words, intransitivities in meaning, or the triangular inequality law that applies to distances, is a fundamental part of the MDS computational process. If all subjects did not adhere to this and other rules, the solution would never converge and the program would terminate unsuccessfully. And this happens irrespective of the format of the stimulus. In traditional measures, however, it is the peculiarities of say adjectives that one must deal with in cleansing the data. A scoring program for a standard adjective
format personality test must be specifically written for transgressions of meaning, for example, that self-reported "dominant" and "submissive" should not appear in the same protocol. There is a built-in logic of similarity in all multidimensional scaling techniques that is not dependent on the peculiarities of the stimulus configuration. This feature also serves to bring the whole testing process closer to the data and further from the hands-on contamination of the experimenter.

Directions for Future Research

The results suggest several new directions this research program might take. First, given that most subjects chose to distance themselves widely from the vignette characters, it may be the case that with the addition of subtler, say, less intense acts with more (interpersonally neutral) filler material to widen out the contexts covered in the stories, that people would align themselves closer to the characters. They may even spread themselves out more broadly around the circle. A problem with the characters used in the studies described above is that they were closer to caricatures than real life people. With less intensity and more context with which to pull the behaviors and make them more believable, perhaps the assessments would improve.

Now that we know that the structure of the prototypes can possess circumplex properties, and given that some improvements may be made to the current vignettes in future studies, no longer do subjects have to rate the similarity of each vignette
with all the other vignettes. Rather, subjects need only compare themselves to the characters with just 16 (8 if only the usual self is used) as opposed to 45 ratings in the studies described here.

Given the new graphics and animation capabilities of recently available supercomputers, a desirable strategy for future research would be to employ such technologies in the development of prototype characters that actual behave. Thus subjects would not have to read about the acts that actors perform, instead they could observe them straight away! This would obviate any reading prerequisites that might disadvantage some subjects who know English only as a second language (cf. Paunonen & Jackson, 1979). This would also open up a world of child assessment that has hitherto been unknown.

Another application for these techniques may reside in the business world. Specialized prototypes acting in specific work environments may make it easier for employers to match up specific personality types with specific job requirements. Job candidates could be assessed in a matter of minutes at a microcomputer. Given the prevalence and cost of personal computers today, such assessments would be extremely feasible and cost effective.

Concluding Remarks

The present series of studies suggest a new and simpler (for the test-taker) approach to personality assessment that employs multidimensional scaling techniques on a microcomputer in the
place of traditional paper-and-pencil measures. The newer DISPRO techniques boast the use of similarity ratings that allow the subject to control the dimensions that are relevant to the task at hand rather than those selected by the experimenter. These techniques may prove very useful and effective in the long run. But the usual end-of-dissertation-caveat applies here as well -- it is still too early to tell.

Even though one way to view the results of the zero-order correlational analysis is to simply note the frequency of significant coefficients in the right places and their magnitude, another way to interpret the overall findings is in line with the philosophy that sees "the glass as half full" instead of half empty. That is to say, one could focus at the very least on the number of significant values that were found to exist between these differing methodologies and that they were as theoretically interpretable as they were! One thing that is certain is that the two domains are demonstrably linked both theoretically and empirically and that a valid new technology exists for personality assessment. But not unlike any new technology, this one comes with some room for improvement.

Partridge (1984) was unable to obtain a circular structure from the interpersonal stimuli she used and interpreted a unidimensional finding to be the result of an evaluative context which overwhelmed the solution. An attempt has been made in the present studies to shore up the bi-dimensionality of the DISPRO interpersonal prototype rating task by standardizing the stimuli
against which the subject is to compare him or herself. This evidently served to remove the enormously evaluative component of self-appraisal inherent in her procedure. The task of the subject in the last study was simply to identify which out of eight hypothetical people s/he is most like (not which aspect of the self, e.g., the cold self, is the most salient).

Results from the descriptive analyses in this study showed that although people are willing to align themselves with any of the possible eight characters they read about on the micro screen, that the most popular vignettes to align oneself with were the extraverted and nurturant categories, the two behavioral modes our culture rewards the most.
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Table 1
20 Most Prototypical Dominant Acts

1. I demanded that he run an errand.
2. I interrupted a conversation.
3. I argued vigorously on behalf of my personal beliefs.
4. I made a bold sexual advance.
5. I chose to sit at the head of the table.
6. I yelled in order to get my way.
7. I set goals for the group.
8. I decided which programs we would watch on TV.
9. I gave advise, although none was requested.
10. I told him which items he should purchase.
11. I persuaded him to do something he didn’t want to do.
12. I took the initiative in a sexual encounter.
13. I took the lead in livening up a dull party.
14. I took charge of things at the committee meeting.
15. I took a stand on the issue without waiting to find out what others thought.
16. I settled the dispute among other members of the group.
17. I persuaded others to accept my opinion on the issue.
18. I managed to control the outcome of the meeting without the others being aware of it.
19. I took the lead in organizing a project.
20. I challenged someone to discuss his/her position.

Note. Number beside each act denotes its prototypicality ranking.
Table 2
Partridge MDS Stimuli

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Your usual social self</td>
</tr>
<tr>
<td>2.</td>
<td>Your ideal self</td>
</tr>
<tr>
<td>3.</td>
<td>Your problem self</td>
</tr>
<tr>
<td>4.</td>
<td>Your sexual self</td>
</tr>
<tr>
<td>5.</td>
<td>Your warm self</td>
</tr>
<tr>
<td>6.</td>
<td>Your cold self</td>
</tr>
<tr>
<td>7.</td>
<td>Your agreeable self</td>
</tr>
<tr>
<td>8.</td>
<td>Your dominant self</td>
</tr>
<tr>
<td>9.</td>
<td>Your quarrelsome self</td>
</tr>
<tr>
<td>10.</td>
<td>Your submissive self</td>
</tr>
<tr>
<td>11.</td>
<td>Your ambitious self</td>
</tr>
<tr>
<td>12.</td>
<td>Your lazy self</td>
</tr>
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</table>
Table 3
Mean Ratings for Vignettes Varying in Intensity and Distinctiveness

<table>
<thead>
<tr>
<th>Trait</th>
<th>Vignette Version</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Calculating</td>
<td>7.8</td>
</tr>
<tr>
<td>Quarrelsome</td>
<td>8.4</td>
</tr>
</tbody>
</table>

Note. Vignette version C is the least intense and most distinctive. Each vignette was rated on two 10-place scales, dominance and hostility. These means represent averages across both sets of scales for each vignette.

p < .05 for all pairwise comparisons across rows.
<table>
<thead>
<tr>
<th>Trait of Prototypical Actor</th>
<th>DOM</th>
<th>CAL</th>
<th>CLD</th>
<th>INT</th>
<th>SUB</th>
<th>ING</th>
<th>AGR</th>
<th>EXT</th>
<th>ESTEEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAS Dominant</td>
<td>-.32***</td>
<td>-.25*</td>
<td>-.26*</td>
<td>.11</td>
<td>.10</td>
<td>.10</td>
<td>.11</td>
<td>-.22*</td>
<td>-.38***</td>
</tr>
<tr>
<td>IAS Calculating</td>
<td>-.31***</td>
<td>-.27*</td>
<td>-.28*</td>
<td>.12</td>
<td>.10</td>
<td>.23*</td>
<td>.12</td>
<td>-.20*</td>
<td>-.01</td>
</tr>
<tr>
<td>IAS Quarrelsome</td>
<td>-.35***</td>
<td>-.27*</td>
<td>-.38*</td>
<td>-.07</td>
<td>.12</td>
<td>.20*</td>
<td>.24*</td>
<td>.22*</td>
<td>.12</td>
</tr>
<tr>
<td>IAS Introverted</td>
<td>.25*</td>
<td>.02</td>
<td>.12</td>
<td>-.26*</td>
<td>-.15*</td>
<td>.01</td>
<td>.10</td>
<td>.22*</td>
<td>.31**</td>
</tr>
<tr>
<td>IAS Submissive</td>
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Note. Underlined coefficients in IAS section are expected to be the highest. Esteem = distance between usual and ideal selves; INV = inventory; DOM = dominance; CAL = calculating; CLD = cold; INT = introversion; SUB = submission; ING = ingenuous; AGR = agreeable; EXT = extraversion; IAS = Interpersonal Adjective Scales; PRF = Personality Research Form; ACL = Adjective Check List; CPI = California Psychological Inventory; Assured Dom = Assured-Dominant; Arrogant-Cal = Arrogant-Calculating; Cold-Quarrel = Cold-Quarrelsome; Aloof-Intro = Aloof-Introverted; Unassured-Sub = Unassured-Submissive; Warm-Agreeab = Warm-Agreeable; Gregarious-Extra = Gregarious-Extraverted; Cog Structure = Cognitive Structure; Soc Recognit = Social Recognition; Pers Adjusmen = personal adjustment; Heteroaex = Heterosexuality; Couna Readi = Counselling Readiness; Cap for Stat = Capacity for Status; Responsibil = Responsibility; Good impress = Good Impression; AchievementC = Achievement via Conformance; Achievement-I = Achievement via Independence; Intellec eff = Intellectual efficiency; Psych-minded = Psychological-mindedness.

* p < .05  
** p < .01
Table 5  
Multiple Regression Coefficients for MDS Distance Scores and ACL, PRF, CPI, & IAS Scale Scores on Self-Esteem

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Note. Self-esteem items were deleted from IAS predictor scales. Multiple Rs were adjusted for N and number of scales in equation. IAS = Interpersonal Adjective Scales; PRF = Personality Research Form; ACL = Adjective Check List; CPI = California Psychological Inventory. *p < .00001
Table 6
Multiple Regression Coefficients for MDS Distance Scores, CPI and PRF Scale Scores on IAS Dominance

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Note. R Squares were adjusted for N and number of variables in equation. IAS = Interpersonal Adjective Scales; PRF = Personality Research Form; CPI = California Psychological Inventory.
*p < .00001
Table 7
Multiple Regression Coefficients for MDS Distance Scores, ACL and IAS Scale Scores on PRF Dominance

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Note. *R Squares were adjusted for N and number of variables in equation. IAS = Interpersonal Adjective Scales; PRF = Personality Research Form; CPI = California Psychological Inventory. *p < .00001
Figure 1

- Dominant
- Extraverted
- Calculating
- Quarrelsome
- Introverted
- Agreeable
- Ingenuous
- Submissive
Figure 2
Two Dimensional Plot of Partridge Stimuli

- Lazy Self

- Ambitious Self

Usual Social Self
- * Warm Self

Ideal Sexual Self
- * Self

- Agreeable Self

Dominant Self

- Submissive Self

Problem Self
- * Self

- Quarrelsome Self

- Cold Self
Figure 3

- Chris Bradley
- Dale Edwards
- Francis Graham
- Jerry Knudson
- KEL Oliver
- Leslie Martin
- Pat Armstrong

[Graph showing the positions of individuals along two axes labeled Pat Armstrong and 80.]
Figure 4
Empirical Plot of IAS Circumplex

Dominant
A

Calculating
C

Extraverted

Agreeable
M

Introduce
G

Introverted

K

Ingenuous

Submissive
I
Figure 5

PAT ARMSTRONG

CHRIS BRADLEY

NEL OLIVER

DALF EDWARDS

LESLEY MARTIN

FRANCISE GRAHAM

JERRY KNUSDON

HILLARY IRWIN
Figure 6

Pat Armstrong

Chris Bradley

Neil Oliver

Leslie Martin

Dale Edwards

Francis Graham

Jerry Hudson

Bill Armstrong

Usual Self

Ideal Self
Appendix A

Mathematical Summary of the Multiscale II MDS Model

This summary is adapted from the MULTISCALE II users manual (Ramsey, 1983, pp. 42-43). Let I indicate the number of stimuli and R indicate the number of subjects. For stimulus pair (i,j) and subject r the dissimilarity judgment or index will be denoted by \( d_{ijr} \) and the corresponding distance by \( d_{ijr}^* \). It will be assumed that all dissimilarity observations are positive.

The MULTISCALE model used in this thesis was a general individual differences distance model (similar to the one used in INDSCAL (Carroll & Chang, 1970). The model is,

\[
d_{ijr}^* = \sqrt{\sum_{mn} (x_{im} - x_{jm})^2 w_{rmn} (x_{in} - x_{jn})^2}
\]

where the number of dimensions is indicated by M. For each subject r the weights \( w_{rmn} \) form an M by M symmetric positive definite matrix \( W_r \) termed the metric matrix. If the \( W_r \)'s are otherwise unrestricted, this distance model is termed the full metric model.

MULTISCALE computes distances \( d_{ijr} \) so as to provide optimal fit of either (a) log \( d_{ijr}^* \) to log \( d_{ijr} \) of (b) \( d_{ijr}^* \) to \( d_{ijr} \). The first case is the default one.
A day in the life of Pat Armstrong

That morning, before leaving on vacation, Pat told the others at work to do the menial tasks instead of doing it himself. He singled out George in particular, told him which of the jobs he should take and forbade him to leave the room until he was finished. A moment later, in the hallway, Pat interrupted Harold’s conversation and demanded he run an errand. Walking ahead of everyone else, Pat turned back to Harold and told him exactly which item he should purchase.

Later that day, during the drive to the lake, Pat decided which directions to take when they got lost. When, in the process, they happened upon a bad accident, Pat pulled over and took command of the situation, directing traffic and sending someone for help.

When they finally got into their motel room for the night and met up with their friends, Pat put on the TV and selected one of the movie channels to watch. After the movie, when they were selecting a late night restaurant, Pat’s choice won out.
A day in the life of Chris Braddely

While waiting for the elevator to take him to the board meeting, Chris checked the payphone for leftover change. On the way up to the fortieth floor, he chatted with Sue, his boss's secretary, whom he had befriended to get strategic information from soon after she had started her job. This time he managed to find out what involved him on the "secret" agenda. He played innocent during the meeting when the boss wondered how he seemed to be able to anticipate everything -- he could lie without batting an eye.

Chris never ignored an opportunity to take advantage of a situation to get what he wanted. If he was planning to skip work one day, he would fake a sore back at work the day before and take advantage of his "injury" to extract small favours from co-workers before he left for the day. But today he left on time, hitching a ride with Sue, then borrowing her car to run some errands since his car was in the shop.

That evening, when dining out with friends, Chris claimed to be broke when he wasn't, managing once again to get someone else to pay the bill. At the bar afterwards, they discussed the sales for last month and Chris thought about how much money he would make. He ignored his best friends' family, who had joined their table, because they didn't have anything he wanted.
A day in the life of Dale Edwards

Dale ended the conversation with his partner, Jan, by stalking out of the room, slamming the door behind him. Dale began the argument over whose turn it was to drive home from the party they were going to that night. It was a senseless argument, but he drew her into it anyway and even complained about the favours he did for her that week. As usual, Dale took the opposite point of view just to be contrary, and continued to argue points even after conceding them.

Just for spite, he refused to dress for the occasion and cursed and belly-ached because it was raining. At the party, Jan noticed that Dale’s brother called him on the telephone. Jan also noticed that Dale replaced the receiver without saying goodbye.
Distance From The Prototype

A day in the life of Francis Graham

Francis stayed home all day alone without speaking to anyone. In the morning he kept his shades down and sat in the dark listening to the music. He read his latest novel all afternoon and that evening went for a long walk along the sea-wall.

Saturday, Francis ate lunch in the corner of the cafeteria while reading his book. He had reluctantly agreed to go to a party that night with his friend Cindy, and so he did. He walked into the room full of people without talking much to anyone, staying close to Cindy and not trying to meet anyone. He managed to escape for a while to read his book in the other room.
A day in the life of Hillary Irwin

Hillary was late for work and accepted the resulting verbal abuse of his friend, Phil, without defending himself or talking back when he was scolded. He continued to apologize to Phil about it all morning.

At dinner he listened quietly when his parents said his hair was ugly. He was alone with his parents at this meal since they had convinced him to break off with his lover a week ago. He missed her a lot, but kept it to himself. Afterwards, when Phil and a couple of friends who had dropped by to pick him up made fun of his clothes, he changed into the jacket that Phil had convinced him to buy before they left. On the way to the party he pondered the truth in what his parents had told him, that his grades had declined due to peer pressure to party all the time. Just then they happened to drive by the city's campaigning mayor and Hillary found himself joining in on the verbal criticism of this person mainly because everyone else did. Likewise, he smoked the marijuana that was passed to him even though he didn't particularly want to.
A day in the life of Hillary Irwin

Hillary was late for work and accepted the resulting verbal abuse of his friend, Phil, without defending himself or talking back when he was scolded. He continued to apologize to Phil about it all morning.

At dinner he listened quietly when his parents said his hair was ugly. He was alone with his parents at this meal since they had convinced him to break off with his lover a week ago. He missed her a lot, but kept it to himself. Afterwards, when Phil and a couple of friends who had dropped by to pick him up made fun of his clothes, he changed into the jacket that Phil had convinced him to buy before they left. On the way to the party he pondered the truth in what his parents had told him, that his grades had declined due to peer pressure to party all the time. Just then they happened to drive by the city’s campaigning mayor and Hillary found himself joining in on the verbal criticism of this person mainly because everyone else did. Likewise, he smoked the marijuana that was passed to him even though he didn’t particularly want to.
A day in the life of Jerry Knudson

This was the day that Jerry had agreed to let his girlfriend, Sally, cut his hair, although she was inexperienced at it. When it was time to go to Sally's, he left, not bothering to lock the front door, which he had left unlocked overnight. Before he left, there was a knock at the door --- he opened it without asking who was there. It was just the paper-boy.

On the way to Sally's, he stopped in at the shopping centre. Leaving his car unlocked with the key in the ignition, he picked up some shampoo, a new brand that the television ads promised would make hair more shiny. Jerry often believed ads like that. Driving to Sally's he stopped once more, this time to pick up his belongings at the library that he had left there the day before.

During his haircut he told Sally the news that he would be out of town for a couple of weeks in the near future. He told her to enjoy herself when he was gone, "Do whatever you like with whom you like", and added that he knew she would be faithful to him during his absence.
A day in the life of Leslie Martin

That morning Leslie decided to skip class to stay with a friend who needed him. He promised his friend (Jack) he would be over as soon as possible and yes he would help him with his difficult assignment. Before he left though, he cleaned the bathroom because his roommate did it the previous time. On the way over he went out of his way to drop Sam, another friend, at school. In their conversation before he jumped out, Sam got the information he needed to nurse his sick car back to health. As they traded goodbyes, they also agreed to meet later that evening at Leslie's date's house and maybe visit a while with her parents, who he got along well with, before heading out to the party. As it turned out, they never did make it to the party as Leslie's car also died that night.

The next morning Leslie called his friend and offered to help him move in to the new apartment that day. He hopped on a bus, giving up his seat to an older person. He refrained from insulting the obnoxious person who had refused his seat to the same old lady.
A day in the life of Nel Oliver

Saturday afternoon, Nel wore bizarre clothing to the supermarket to get supplies for tonight's party. He chose the place for everyone to meet --- the same bar he went to the night before, to socialize. He decided against his favourite disco on the grounds that it would be too loud to talk, even that early in the evening.

Nel got to the bar a little early to get there before the office people. He joked with the waitress and engaged her in conversation. When the rest of them arrived at the bar, Nel started off the evening by singing the office softball team theme song in front of the whole group.

Later that night, Nel talked to almost everyone at the party. His friend Jane wanted to know why she couldn't get through on his phone line the other night. He replied that he was on the phone himself, all night long.

Nell danced throughout the evening in front of the crowd. Later, when Nell and some friends walked down to the restaurant nearby, Nel sang loudly in the street all the way there.
APPENDIX C

Circumplex Analyses and Projections
A CIRCUMPLEX GENERATOR/ANALYZER

TITLE: IAS(16ths) & DISPRO SCORES (the latter on the former)

NUMBER OF ITEMS IN POOL = 17
NUMBER OF ITERATIONS = 0
NUMBER OF CASES = 140
MATRIX FACTORED = CORRELATION
ROTATED
SCALES FACTORED ON FIRST ITERATION
REQUESTED COMPONENTS ARE 1 AND 2

INITIALIZING AND/OR MARKER SCALES:

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EIGENVALUES CORRESPONDING TO REQUESTED COMPONENTS: INITIALIZING SCALES
3.21  2.40  0.95

CUMULATIVE PROPORTION OF VARIANCE ACCOUNTED FOR:
40.11  70.12  82.04

FACTOR SCORE COEFFICIENTS:
0.028  -0.235  -0.323  -0.156  -0.015  0.249  0.333  0.237
0.268  0.200  -0.021  -0.212  -0.272  -0.201  -0.055  0.199

COMMUNALITY AND ANGLE OF EACH ITEM IN POOL:

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FACTOR PLOT FOR REQUESTED COMPONENTS: RESULTING SCALES

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*************** END OF OUTPUT***************
A CIRCUMPLEX GENERATOR/ANALYZER

TITLE: IAS(16ths) & DISPRO SCORES

NUMBER OF ITEMS IN POOL = 17
NUMBER OF ITERATIONS = 0
NUMBER OF CASES = 140
MATRIX FACTORED = CORRELATION
ROTATED
SCALES FACTORED ON FIRST ITERATION
REQUESTED COMPONENTS ARE 1 AND 2

INITIALIZING AND/OR MARKER SCALES:

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EIGENVALUES CORRESPONDING TO REQUESTED COMPONENTS: INITIALIZING SCALES
3.25  2.34  0.80

CUMULATIVE PROPORTION OF VARIANCE ACCOUNTED FOR:
40.66  69.86  79.91

FACTOR SCORE COEFFICIENTS:
-0.054 -0.222 -0.341 -0.215 -0.030 0.174 0.330 0.262
0.256 0.162 0.025 -0.230 -0.272 -0.215 0.012 0.215

COMMUNALITY AND ANGLE OF EACH ITEM IN POOL:

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FACTOR PLOT FOR REQUESTED COMPONENTS: RESULTING SCALES

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14

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APPENDIX D

Multiple Regression Summary Tables
**MULTIPLE REGRESSION**

Listwise Deletion of Missing Data

Equation Number 1  Dependent Variable: IASSES

Beginning Block Number 1. Method: Enter

Variable(s) Entered on Step Number

1. DISCREP
2. DISING
3. DISAGR
4. DISEXT
5. DISQUA
6. DISDOM
7. DISCAL
8. DISINT
9. DISSUB

Multiple R .76723
R Square .58864
Adjusted R Square .56016
Standard Error .75251

Analysis of Variance

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**MULTIPLE REGRESSION**

Listwise Deletion of Missing Data

Equation Number 1  Dependent Variable: IASDOM

Beginning Block Number 1. Method: Enter

Variable(s) Entered on Step Number
1. DISCREP
2. DISQUA
3. DISING
4. DISEXT
5. DISDOM
6. DISCAL
7. DISAGR
8. DISINT
9. DISSUB

Multiple R  
R Square  
Adjusted R Square  
Standard Error

Analysis of Variance

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----- Variables in the Equation ----- 

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**MULTIPLE REGRESSION**

Listwise Deletion of Missing Data

Equation Number 1  Dependent Variable..  IASDCM

Beginning Block Number 1.  Method: Enter

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3. .. PRFABA
4. .. PRFORD
5. .. PRFSOC
6. .. PRFHAR
7. .. PRFSEN
8. .. PRFACH
9. .. PRFSUC
10.. PRFCHA
11.. PRFCOG
12.. PRFAGG
13.. PRPNUR
14.. PRPDEF
15.. PRPPLA
16.. PRPFEND
17.. PRPIMP
18.. PRPDOM
19.. PRPFEXH
20.. PRFAUT

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Standard Error  5.83852

Analysis of Variance

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**MULTIPLE REGRESSION**

Equation Number 1  Dependent Variable..  IASDOM

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** MULTIPLE REGRESSION **

Listwise Deletion of Missing Data

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2..  ACLSCN  
3..  ACLLAB  
4..  ACLSUC  
5..  ACLORD  
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14..  ACLNUR  
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R Square .67216  
Adjusted R Square .57129  
Standard Error 2.91031  

Analysis of Variance  

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**MULTIPLE REGRESSION**

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Listwise Deletion of Missing Data

Equation Number 1  Dependent Variable.. IASDOM

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Variable(s) Entered on Step Number
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2.. CPITOL
3.. CPILE
4.. CPISAC
5.. CPICOM
6.. CPIPSY
7.. CPIGOO
8.. CPIRES
9.. CPISCL
10.. CPIASI
11.. CPIDOM
12.. CPIWEL
13.. CPIACC
14.. CPICAP
15.. CPIINT
16.. CPISPR
17.. CPISOC
18.. CPISCO

Multiple R  .79960
R Square  .63936
Adjusted R Square  .54247
Standard Error  5.92887

Analysis of Variance

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### Multiple Regression

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**MULTIPLE REGRESSION**

Listwise Deletion of Missing Data

Equation Number 1  Dependent Variable..  PRFDOM

Beginning Block Number 1  Method: Enter

Variable(s) Entered on Step Number
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2..  IASING
3..  IASQUA
4..  IASSUB
5..  IASAGR
6..  IASCAL
7..  IASDOM
8..  IASINT

Multiple R  .71039
R Square  .50465
Adjusted R Square  .45319
Standard Error  3.28681

Analysis of Variance

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**MULTIPLE REGRESSION**

Listwise Deletion of Missing Data

Equation Number 1  Dependent Variable.. IASSES

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11.. PRFCOG
12.. PRFAGG
13.. PRFNUR
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20.. PRFAUT

Multiple R .75510
R Square .57017
Adjusted R Square .43792
Standard Error 4.45344

Analysis of Variance

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* * * Multiple Regression * * *

Equation Number 1  Dependent Variable.. IASSES

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MULTIPLE REGRESSION

Listwise Deletion of Missing Data

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5... ACLORD
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7... ACLHET
8... ACALAUT
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11... ACALPER
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13... ACALACH
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17... ACLSCO
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20... ACLDOM

Multiple R .81315
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Adjusted R Square .55697
Standard Error 3.95377

Analysis of Variance

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### Multiple Regression

#### Equation Number 1

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End Block Number 1  All requested variables entered.
**MULTIPLE REGRESSION**

Listwise Deletion of Missing Data

Equation Number 1  Dependent Variable.. IASSES

Beginning Block Number 1. Method: Enter

Variable(s) Entered on Step Number
1.. CPIFEM
2.. CPITOL
3.. CPIFLE
4.. CPISAC
5.. CPICOM
6.. CPIPSY
7.. C Pigoo
8.. CPIRES
9.. CPISCL
10.. CPIASI
11.. CPIDOM
12.. CPIWEL
13.. CPIACC
14.. CPICAP
15.. CPIINT
16.. CPISPR
17.. CPISOC
18.. CPISCO

Multiple R       .73599
R Square         .54168
Adjusted R Square .41855
Standard Error   4.52950

Analysis of Variance

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<thead>
<tr>
<th></th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
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<tbody>
<tr>
<td>Regression</td>
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<tr>
<td>Residual</td>
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F = 4.39927  Signif F = .0000
** ** ** M U L T I P L E  R E G R E S S I O N  ** ** **

Equation Number 1  Dependent Variable.. IASSES

----- Variables in the Equation -----

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<thead>
<tr>
<th>Variable</th>
<th>Correl</th>
<th>Part Cor</th>
<th>Partial</th>
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End Block Number 1  All requested variables entered.
**MULTIPLE REGRESSION**

Listwise Deletion of Missing Data

Equation Number 1 Dependent Variable.. IASSEST

Beginning Block Number 1. Method: Enter

Variable(s) Entered on Step Number
1. IASEXT
2. IASING
3. IASQUA
4. IASDOM
5. IASSUB
6. IASAGR
7. IASCAL
8. IASINT

Multiple, R .74637
R Square .55707
Adjusted R Square .51221
Standard Error 4.09929

Analysis of Variance

<table>
<thead>
<tr>
<th></th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
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<td>Residual</td>
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F = 12.41947 Signif F = .0000

----- Variables in the Equation -----

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End Block Number 1 All requested variables entered.