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Predicting predictables via convergent personality assessment: An empirical analysis

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PREDICTING PREDICTABLES VIA CONVERGENT PERSONALITY ASSESSMENT: AN EMPIRICAL ANALYSIS

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Debate over the existence of personality traits that are cross-situationally consistent and measurable via psychological assessment has been historically, and is currently, heated (Alker, 1972; Allport, 1937, 1966; Mischel, 1968). The literature suggests that behavioral predictions from personality assessment are usually in the range from r = .30 to r = .40. This indicates that personality variables do not account for much more than 10-16% of the variation in human behavior (Bowers, 1973; Funder and Ozer, 1983). The present study utilized four approaches for improving behavioral predictions. First, non-verbal, self-report, and peer-report measures of personality were employed to provide personality data from several perspectives (Funder, 1983). Second, Monson, Hesley, and Chernick's (1982) suggestion of using behavioral tasks with low stimulus pull was included. Third, a strategy designed to discriminate between predictable and non-predictable individuals on the basis of extreme scores was utilized (Levy, 1983). Fourth, a non-verbal behavioral measure was employed in an effort to quantify subjects' intraindividual variability (Means and Harper, 1970). Subjects were 195 introductory psychology students who volunteered to participate in the study in order to fulfill a class requirement. Overall, 67 predictor variables and 27 criterion variables were analyzed using a correlational design and multiple regression analyses. The results were difficult to interpret, but generally suggested five conclusions. First, non-verbal measures were the best predictors of conceptually similar non-verbal behaviors. Second, self-report measures generally provided the best predictions for subjects' self-ratings of image quality. Third, non-verbal and self-report measures combined generally provided the best predictions across all variables. Fourth, the r = .40 (R^2 = 16%) barrier was marginally exceeded using crude measurement techniques, low stimulus pull situations, and multiple regression analyses. Fifth, analysis of extreme scorers produced prediction rates that accounted for, at times, up to 40-50% of the variance. Results were discussed in terms of their limited generality, research implications, and support for a psychometrically acceptable non-verbal measure of personality.

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CHAPTER I

INTRODUCTION

Traditionally, personologists and personality theorists have operated on the assumption that personality variables comprise the major source of behavioral variance among individuals. Such theorists have also asserted that personality traits are expressed in a consistent manner across situations as well as across time. Clinical psychologists rely on this assumption a great deal, particularly when utilizing common and generally accepted assessment devices (e.g., MMPI, Rorschach, TAT, etc.). Whether the setting is the clinic, the courtroom, the school, or industry, psychologists often rely heavily on the ability of standard assessment devices to predict subsequent overt or covert behavior (Wade and Baker, 1977). Ironically, empirical support for such procedures is quite poor (Mischel, 1968; Sawyer, 1966). In fact, debate over the existence of salient personality traits which are cross-situationally consistent has been historically, and is currently, heated (Alker, 1972; Allport, 1931, 1937, 1966; Bowers, 1973; Cheek, 1982; Fiske, 1979; Mischel, 1968, 1969, 1973, 1977, 1979, 1983; Wachtel, 1973).

Initially, theorists who advocated the use of personality traits as behavioral predictors were the primary focus of criticism (Mischel, 1968). However, in recent years it has been noted that when it comes to predicting behavior, analysis of the situation offers little, if any advantage over personality assessment (Bowers, 1973; Funder and Ozer, 1983). More specifically, prediction rates in the literature are usually found to be in the range of r = .30 to r = .40. This indicates that neither person or situation variables account for much more than 10 to 16% of the variation in human behavior (Bowers, 1973; Funder and Ozer, 1983; Mischel, 1968). The logical, though disappointing, conclusion is that personality researchers have fared rather poorly when it comes to predicting complex behavioral events.

The crux of the problem outlined above involves the predictability of human behavior. Human beings are complex organisms with a vast array of behavioral alternatives at their disposal. Perhaps they are not predictable and the disappointing research results are merely a reflection of reality? While that is certainly a possibility, the many criticisms of personality assessment combined with the yet untried suggestions for improvement in the area suggest that there are still some innovative approaches left which may produce more behaviorally valid predictions. Therefore, the

general purpose of the following study was to attempt to improve behavioral prediction rates by combining various approaches recommended in the literature.

Four approaches for improving behavioral prediction rates were utilized in this study. First, a relatively untested non-verbal behavioral measure was employed to assess personality. This measure was designed to measure the constructs of intraindividual variability and constriction/expansion (Fiske and Maddi, 1961; Means and Harper, 1970). Its inclusion was primarily for exploratory purposes. Second, more conventional self-report and peer-report strategies were also used to assess personality. This multimethod approach to assessment can be labeled 'convergent assessment' and has been supported in the literature as potentially a way to improve both personality interpretations and behavioral predictions (Epstein, 1979, 1980, 1983; Funder, 1983). Third, Monson, Hesley, and Chernick's (1982) suggestion of using behavioral tasks with low stimulus or situational pull was included. The purpose of using such tasks was to enhance the influence of each individual's personality on his/her behavior so as to increase the predictive power of the personality assessments. Fourth, a strategy designed to discriminate between predictable and non-predictable individuals on the basis of extreme scores was utilized. Such a procedure has

been employed effectively in the field of social psychology and recommended by personality researchers (Levy, 1983; Sherman and Fazio, 1983).

To facilitate understanding of the procedures used in this study, a literature review was conducted that encompassed the following areas: 1) the definition of personality; 2) an historical overview of traitology and personality assessment; 3) research strategies and measurement problems in personality assessment; 4) self-report, peer-report, and behavioral description; 5) normality and psychopathology and its relationship to prediction from personality assessment; 6) intraindividual variability as a personality trait and behavioral predictor; 7) attribution, gestalt psychology, and the inaccuracy of the intuitive clinician; 8) current developments in the person-situation debate.

CHAPTER II

REVIEW OF THE LITERATURE

Personality Defined

The operational definition of personality to be employed here is of a dual nature, acknowledging the biological as well as the environmental components that interact to form the 'person.' This definition is clearly expressed by Millon (1981).

> "Personality is seen today as a complex pattern of deeply embedded psychological characteristics that are largely unconscious, cannot be eradicated easily, and express themselves automatically in almost every facet of functioning. Intrinsic and pervasive, these traits emerge from a complicated matrix of biological dispositions and experiential learnings and now comprise the individual's distinctive pattern of perceiving, feeling, thinking, and coping" (p. 8).

Note that Millon (1981) addresses both the "biological dispositions and experiential learnings" as contributors to the formation of personality. Employment of this working definition does not preclude the importance of situational influences on producing behavior. Rather, it emphasizes the importance of the environment in "etching" a particular pattern of traits into an individual's personality (Millon, p.4). Moreover, while one's personality traits are a function, in part, of one's situational history, they are

also manifest to a greater or lesser degree as a function of the immediate situation.

An Historical Overview of Traitology and Personality Assessment

The essence of the person-situation debate has historical roots. Its history is marked by the emergence and re-emergence of unsettled controversy. Recently, the cyclical characteristics of the person-situation debate has moved one personality theorist to comment on its 'deja vu' nature (Mischel, 1983).

Some authors have noted the presence of primitive forms of personality assessment as early as 3000 B.C., when the Chinese utilized a standard system of palmistry to describe personality and predict behavior (Lanyon and Goodstein, 1971). Bem (1980) cites Theophrastus (372-287 B.C.) as the first personologist to break into the literature.

> "A Penurious Man is one who goes to a debtor to ask for his half-obol interest before the end of the month. At a dinner where expenses are shared, he counts the number of cups each person drinks and he makes a smaller libation to Artemis than anyone.... If his wife drops a copper, he moves furniture, beds, chests and hunts in the curtains..." (Quoted in Allport, 1937, p.57).

More recently, and probably of more practical interest are the two divergent origins of modern personality assessment,

namely, the study of individual differences and the clinical assessment of psychopathology.

The contemporary study of individual differences has its origins in Galton's early studies of the differences in non-intellectual faculties (Galton, 1884). Galton's work helped stimulate the pioneering efforts of scientists to measure and quantify the systematic differences between individuals. While some of Galton's followers emphasized the development of standard psychological measurement devices (Binet and Simon, 1905; Cattell, 1946), others focused on the use of statistical procedures necessary to quantify assessment findings (Lanyon and Goodstein, 1971, p. 8). Thus, Galton's initial pioneering work influenced contemporary psychologists as they now have in their repertoire a multitude of empirically validated psychological assessment devices, e.g., personality inventories, intelligence tests, etc.

The clinical assessment of psychopathology is generally believed to have originated with the work of Emil Kraeplin and his colleagues. Kraeplin implemented word association procedures to differentiate between various kinds of mental disorders (Anastasi, 1961, p. 16). Later elaborations of his technique were offered by such notable clinicians as Sigmund Freud and Carl Jung (Lanyon and Goodstein, 1971). It was the widespread use of these as well as other

assessment devices (Rorschach. 1942), which led to the popularization of projective techniques by clinicians (Frank, 1939). While projective assessment devices have been heavily criticized for their lack of reliability and validity. contemporary clinical practitioners have largely ignored these criticisms and continue to utilize them at a high rate (Wade and Baker, 1977).

In recent years the entire concept of personality assessment, both objective and projective, has been exposed to strong criticism. Personality researchers and, to some degree, clinicians have begun to openly express doubt regarding the utility of such instruments (Fiske, 1979; Mischel, 1968; Tryon, 1979). An historical landmark in this area is Mischel's (1968) critique of personality assessment and the existence of traits. Mischel (1968) emphasized that personality assessment devices in any form and/or combination have failed to predict subsequent behavior at anything better than an $\underline{r}$ = .30 rate (which is equivalent to accounting for less than 10% of the behavioral variance). Therefore, he suggested that the influence of personality traits on behavior be assumed nil until proven otherwise. This assertion became even more significant as its logic was supported by prominent personologists and interactionists (Bem, 1972; Endler, 1973). Prior to Mischel's work (though not directly related), legal action

was taken to prohibit the use of personality tests in some settings (Amrine, 1965).

If the above criticisms were limited to occasions where personality assessments were used inappropriately, then one might conclude that greater discretion regarding their use would eradicate the problem of measurement and silence the critics. However, the criticism is aimed at the core of personality assessment. The question has been posed, is there an adequate empirical base to justify the use of personality measurement devices by psychologists (who are purportedly, at least in part, scientists)? It is really a question of ethics. Can we as psychologists adequately justify what we are doing?

Therefore, the burden of proof, as stated by Mischel (1968) and Bem (1972) lies with the psychologist as scientist. It is up to the researcher to identify and demonstrate empirical validation for the assessment instruments currently in use. If such validation is not forthcoming it then becomes the researcher's task to develop more sophisticated (or more simple) assessment tools through which personality traits can be measured. Otherwise, the concept of trait as it is known today could be justifiably discarded for more empirically sound theoretical doctrine. Thus, to facilitate an understanding of the current research strategies and measurement problems, the next section will

examine these issues.

Research Strategies and Problems in Personality Assessment

Three basic research strategies have been utilized to determine the existence and/or utility of personality traits. These include correlational studies, factor analytic studies, and analysis of variance studies. Following is a brief description of each of these approaches and some historical examples.

There are three types of correlational studies commonly used in the literature to identify and validate personality traits. First, as exemplified by Hartshorne and May's (1928) classic study on honesty, behavioral expressions of an underlying disposition are taken from different situations and then correlated. Given this strategy, one would expect a strong positive correlation between situations and the salient behavioral expressions. That is, a strong positive correlation would be expected if the personality trait or construct under investigation demonstrated cross-situational consistency/stability. However, the Hartshorne and May (1928) study, as well as most subsequent studies, found only a low to moderate positive covariation for expression of honesty across situations. Therefore, the trait of honesty exhibited

little consistency across situations. Other studies have produced similar findings, which suggest that the actual existence of deeply imbedded personality characteristics that are manifest across situations may be minimal at best (Mischel, 1968).

The second type of correlational study involves the correlation of measures of traits with situation specific behavioral manifestations of those dispositions. These studies generally utilize self-report personality measures and attempt to correlate these measures with overt behavior in a given situation. Findings from studies of this nature have been reported to have 'personality coefficients' which exceed .40 on only rare occasions (Funder and Ozer, 1983). Thus, such studies have provided as much support for the situationist's viewpoint as for the personologist's.

The third type of correlational study involves the use of a multiple regression model to predict subsequent behavior. This technique utilizes multiple observations across assessment situations to determine the contributions to the overall variance by specific assessments, as well as their combinations. The goal is to produce a regression equation which adequately predicts behavior from observation across a number of situations (and with a minimum number of variables). This technique was utilized by Gough (1966), and has been suggested by Alker (1972) as promising for

predicting behavior from personality assessment. Although not widely used in personality research, current researchers advocate its utility in personality research where a theoretically defined construct is being measured via several specified referents (Funder and Ozer, 1983; Moskowitz, 1982).

The factor analytic study is the second general research strategy of interest. This moderately used procedure has produced results similar to the correlational techniques. It involves the observation of traits across a number of situations followed by correlations for each possible pair of situations. Then, via factor analytic techniques the intersituational correlations are reduced to a minimal number of orthogonal dimensions. Theoretically, if a common factor or trait were accounting for a large portion of the overall variance, this common factor would be delineated in the analysis. However, findings with this strategy most often identify a primary component but need the inclusion of several other factors to accurately account for a significant portion of the total variance. Again, the personologist's viewpoint has not received much support from this method. Studies of this nature include Burton (1963), Nelson, Grinder, and Mutterer (1969), and Sakoda (1952). Generally, researchers advocate the use of factor analysis in studies where there are minimal expectations regarding

the interrelations of a large group of behaviors or personality attributes (Funder and Ozer, 1983; Moskowitz, 1982).

Analysis of variance procedures constitute the third and final research strategy. The use of this technique involves the sampling of behavior across situations, subjects, and sometimes response modes. Then, utilizing analysis of variance techniques, the variance is partitioned as independent components due to persons, situations, response modes, and their interactions. Bowers (1973) reviewed some of the literature using this technique and reported 12.71% of the variance accounted for by persons, 10.17% by situations, and 20.17% by their interaction. Thus, the analysis of variance strategy reveals findings much similar to that of the previous methods. That is, personality traits as currently conceptualized account for only a small portion of the variance in behavior as observed across situations. However, it should be noted that Bowers' (1973) review also offered little support for situational components as behavioral predictors.

The preceding review of research strategies characterizes the degree to which researchers have been able to demonstrate the utility of personality traits for behavioral prediction. These findings have been integral to theorists who point out that personality traits are not good

behavioral predictors (Mischel, 1968; 1969; 1973). Given conclusions of this nature, it might be considered discouraging to proceed with attempts to establish evidence supporting the existence of cross-situational personality traits. It would seem that most every approach for establishing personality traits has been tried and failed (Mischel and Peake. 1982). However, the intention of this study was to demonstrate that such is not the case. For example, personality constructs currently available may be inadequate. That is, constructs such as friendliness or honesty probably lack sufficient convergent and discriminant validity to justify their existence as true (pure) constructs (Cronbach and Meehl, 1955; Fiske, 1973). It is more likely that core variables exist which serve to moderate the supposed construct (friendliness or honesty) and account for its presence or non-presence across situations (Bem and Allen, 1974; Cheek, 1982). Second, the techniques by which researchers have traditionally sought to measure personality are fraught with biases, e.g., social desirability (Edwards, 1953), cultural bias (Abe, 1973), idiosyncratic interpretation (Fiske, 1979), etc. As Fiske (1979) points out, the stimuli (questionnaires presented by the experimenter to the subject) are assumed to carry the same inherent meaning for both parties (the experimenter and the subject) when most likely they do not. In addition, the psychometric properties of the measures themselves are

considered by some to contain a substantial amount of methodological artifact (Golding and Knudson, 1975; Mungas and Walsh, in press). Third, it is unreasonable to assume that subjectively interpretable assessment devices can actually predict behavior for all individuals in all cases (Bem and Allen, 1974). Given the variability inherent in the human organism, it seems more reasonable to discriminate between predictable and not-so-predictable persons on each variable or trait of interest (Bem and Allen, 1974; Cheek, 1982). Finally, the notion of the test-trait fallacy serves to further point out the misuse of personality assessment (Carr and Kingsbury, 1938; Tryon, 1979). Allport (1966) describes this fallacy succinctly:

> "Our initial observation of behavior is only in terms of adverbs of action: John behaves aggressively. Then an adjective creeps in: John has an aggressive disposition. Soon a heavy substantive arrives, like William James' cow on the doormat: John has a trait of aggression. The result is the fallacy of misplaced concreteness" (p. 1).

The present study addressed these first three measurement problems directly. The study involved: 1) an attempt to identify and utilize a pure trait construct; 2) an attempt to employ a methodologically sound system of measuring the construct; and, 3) the use of a screening criterion through which unpredictable individuals were

eliminated from the data analysis pool.

Self-Report, Peer-Report, and Behavioral Description

Some researchers have noted that self-report assessment devices correlate most closely with other self-report assessment devices (Endler and Magnusson, 1976; Mischel, 1968; Shranger and Schoenmen, 1979). Given the existence of method bias (Fiske, 1949), such criticisms are logical and justifiable. Peer ratings in personality assessment have been similarly criticized. Although the reliability of peer ratings seems generally acceptable (Nunnally, 1978), the validity of such ratings has been strongly questioned (Fiske, 1949; Mischel, 1968; Shweder, 1975). Most often the method biases cited as inherent in peer measures include the fundamental attribution error (Ross, 1977) and the fact that trait ratings reflect the rater's personal characteristics and not the ratee's behavior (Mischel, 1968; Willerman, 1979). The inability of either technique (self-report and/or peer-report), to produce correlational coefficients in excess of .30 or .40 with actual behavior has resulted in the strongest criticism of personality assessment (Mischel, 1968, 1969).

Despite the fact that it is questionable whether either of these procedures (peer-report and self-report) adequately provide information that is useful in behavioral prediction, they are both still employed. In fact, they are among the most common methods utilized by practitioners today (Wade and Baker, 1977). Additionally, research is often conducted to determine the relationship between self- and peer-ratings (Cheek, 1982). While it is tempting to launch a critique of such research on the grounds that it is unimportant whether or not two measurement methods that are questionably related to behavior correlate, such was not the purpose of this study. Instead, it is suggested that both measurement techniques be conceptualized as alternative ways of assessing the elusive concept of personality (Funder, 1983). Alone, neither of these techniques has demonstrated consistently acceptable validity with respect to behavioral criteria. But together they may begin to converge on an individual's true personality and thus predict behavior. Additionally, it should be mentioned that neither of these procedures should be considered as a validity criterion for either itself or each another. This is because a high degree of correlation of self-report with self-report constitutes reliability, not validity, while a high degree of correlation between self-report and peer-report depicts a strong relationship between two variables that may not be related to behavior. Therefore a strong relationship

between self- and peer-report procedures would not be expected, but if present would indicate the reliable measurement of some phenomenon which may not be relevant to behavior.

Given the inadequacy of self-report and peer-report in predicting behavior, why not turn to behavior itself as a predictor? Behavioral observation as an assessment tool offers both advantages and disadvantages. Advantages include behavioral specificity and high interrater reliability (Fiske, 1979). Disadvantages include categorization and reactivity of the observation process (Horst, 1968; Kessell, 1969). In addition, behavioral assessment is most often considered descriptive rather than predictive, omnibus in nature, and lacking order or organizing principles (Fiske, 1979; Lundin, 1974; Watson, 1930). Finally, some behavioral or perceptual techniques of assessment (e.g., the Rorschach) are often considered ill-suited to quantification.

The non-verbal measure utilized in this study was behavioral in nature. It involved a standard instructional set followed by the requested behavior. Some instructional bias was possible in this procedure but minimized by the simplistic nature of the instructions. Bias, such as social desirability was also minimized as the subjects did not know what constituted a socially desirable response (and

incidently neither did the experimenters). Unlike the Rorschach. quantification of the requested behavior was precise. As a consequence, the non-verbal behavioral measure employed in this study assessed personality from a perspective far different from self-report, peer-report, and traditional behavior ratings. Therefore, it was considered both alone and in conjunction with other procedures in order to assess its utility for the prediction of behavior.

The use of a number of different measurement strategies in assessing personality has been discussed at length by Funder (1983). He notes that behavioral, self-report, and peer-report measures are each merely different methods used to evaluate the person and therefore, should not be considered as criterion for one another. In addition, he claims that subjective ratings can, at times, be superior to behavioral data due to the abstract nature of such ratings. Finally, he recommends that since none of these approaches are empirically superior to the others, that they be used in conjunction with one another with an emphasis on 'when' each is most useful (Funder, 1983).

Normality and Psychopathology and their Relationship to Prediction from Personality Assessment

The idea that people possess stable personality traits is closely related to the assessment of psychopathology (Korchin, 1983). Clearly, psychiatrists and clinical psychologists have continually advocated personality theory as an explainer and predicter of aberrant behavior (Abraham, 1953; Freud, 1913/59; Jones, 1918; Klein, 1948; Reich, 1949; Shapiro, 1965). In contrast, it has been largely anthropologists and social psychologists who emphasize the uselessness of such theory to accurately predict behavior (Meade, 1934; Mischel, 1968). Notably, these two groups of professionals work with populations of people that are markedly different, clinicians with people primarily psychopathological in nature, and social scientists with people who are usually from the 'normal' population. Alker (1972) and others (Fisher and Fisher, 1951) have noted this difference. and pointed out that traits such as rigidity, seem to predict more effectively for pathological populations. Finally, although Alker's (1972) hypothesis has been strongly criticized (Endler, 1973), the issue has simply not been addressed in a manner that warrants taking a strong position either way.

If Alker's (1972) hypothesis were correct, then why would not ssessment studies of psychopathological or hospitalized populations have revealed the more predictable nature of non-normal individuals? In this regard some

research has been conducted that suggests lower functioning individuals tend to demonstrate greater behavioral consistency with respect to their personality traits (Mariotto and Paul, 1975; Mariotto, 1978). Nonetheless, Millon (1981) provides an additional theoretical explanation that helps account for the lack of 'substantial' data in the area. In a discussion of psychopathology, Millon (1981) states that it is necessary to "subdivide psychopathology in terms of certain fundamental criteria" (p. 9). In other words, individuals who exhibit maladaptive personality traits (which are cross-situationally general and predictable) do not comprise the entire psychopathological population. Therefore, even studies of psychiatric patients would necessarily be comprised of a heterogeneous sample of relatively predictable and not so predictable persons. As a result, the question of importance becomes; how to accurately discriminate between predictable and non-predictable individuals so that the practice of personality assessment can be focused on a sub-population where it is useful?

The preceding discussion alludes to the necessity of idiographic procedures when attempting to predict behavior. That nomothetic procedures are not maximally effective in clinical practice has been a longstanding point of contention held by clinicians (Allport, 1937; Carlson,

1975; Korchin, 1983). However, recent research has demonstrated how idiographic and nomothetic approaches may be combined to yield more accurate behavioral predictions on the basis of personality or attitude data (Bem and Allen, 1974; Sherman and Fazio, 1983). Perhaps the simplest application of these procedures comes from social psychology wherein behavioral predictions from attitudes have been improved by including only individuals with strong attitudes in the data analysis (Sherman and Fazio, 1983). Clearly, clinical psychology focuses much of its assessment approaches on a similar sub-population that appears more predictable (Mariotto and Paul, 1975; Mariotto, 1978). Therefore, the hypothesis that individuals with extreme scores on personality tests may be more predictable than the population in general was evaluated in the present study.

Intraindividual Variability as a Behavioral Predictor

Millon (1981) suggests that inflexibility or invariability in responding to the environment is psychologically maladaptive:

> "When an individual displays an ability to cope with the environment in a flexible manner, and when his or her typical perceptions and behavior foster increments in personal satisfaction, then the person may be said to possess a normal or healthy personality. Conversely, when average or everyday responsibilities are responded to inflexibly or defectively, or when the

> individual's perceptions and behaviors result in increments in personal discomfort or curtail opportunities to learn and to grow, then we may speak of a pathological or maladaptive pattern" (Millon, p. 9).

From Millon's (1981) theorizing one may hypothesize that the greater the inflexibility present within the individual, the less likely he or she is to respond to his/her environment in a situationally specific manner. Thus, inflexibility or invariability contributes to consistent trait-like responding across situations.

One might also propose that invariability is biologically maladaptive. Followers of Darwinian theory (Darwin, 1859/1909) would most likely agree that excess invariance or cross-situational consistency in behavior is not conducive to survival. Such theorists would probably agree that an organism needs a certain amount of variability in its behavioral repertoire to improve its chances of survival. In fact, research has been conducted that suggests variability in functioning and experience is a natural, survival related phenomenon (Fiske and Maddi, 1961). Statistically speaking, this 'level of variability' is termed variance, or error. Although researchers and statisticians have historically attempted to reduce the variance in the measurement of human responses, they have acknowledged that the elimination of all variance is impossible (Stanley. 1971). Given the relationship between

variability and survival hypothesized above, it may be to our advantage to study and nurture variation in human behavior rather than continue trying to minimize or eliminate it.

In the present study, intraindividual variability was monitored in a number of ways. Some of the measures were designed (or had scales) to tap elements of variability within individuals. Such measurement was considered an initial attempt at studying intraindividual variability as a personality trait from which behavior can be predicted.

A logical extension of the preceding review might be that maximal survivability of the organism is characterized by absolute variability or randomness. However, such an extension is not intended. Instead, the relationship between survivability and variability is considered curvilinear in nature. The most clear example of this comes from the field of psychopathology. In the case of schizophrenia, both thought and behavior are unpredictable and usually identified as idiosyncratic in nature (Kaplan and Sadock, 1981). This idiosyncracy or variability is not, however, considered evidence for either adjustment or survivability in the schizophrenic. On the contrary, the schizophrenic individual often meets with an early demise (Kaplan and Sadock, 1981). Therefore excessive variability is not associated exclusively with adjustment or

survivability. Instead, it may be characteristic of a deteriorated level of functioning, as in the schizophrenic.

What then are the features that discriminate the variability of the more adjusted individual from the variability of the schizophrenic (or thought disordered individual)? This question, though not central to the present study is worth consideration. First, while the normal or adjusted individual is relatively more variable than the personality disordered individual, the schizophrenic (or thought disordered) individual is often even more variable than the normal individual. Thus, there seems to be an optimal level of variability that denotes healthy functioning, while excessive variability may denote pathology. Second, although the precise amount of variability that is optimal to human functioning is unknown, it probably varies under different environmental conditions (Alker, 1972; Fisher and Fisher, 1951; Leach, 1967).

The preceding discussion is not meant to support the notion that individuals without distinct personalities are the most healthy. On the contrary, individuals with distinct personalities are quite often considered healthy. Such individuals often display interpersonal loyalties, integrity, honesty, and other personality traits which may serve to complicate attempts to predict their precise behavioral patterns. In addition, this type of individual

mixes complex traits with a high receptivity to environmental stimuli resulting in behavioral variability, psychological well-being, and biological survival (Leach, 1967).

Attribution, Gestalt Psychology, and the Inaccuracy of the Intuitive Clinician

In an influential article, Ross (1977) noted three major areas of interest with regard to attribution theory. He refers to these areas as 1) causal judgement, 2) social inference, and 3) prediction of outcomes and behavior. Attribution theory would suggest that human beings, in an attempt to understand their environment, interpret events so as to; 1) identify the cause or set of causes to which the event may be attributed (or explained); 2) make inferences regarding the dispositions of the individual(s) and/or properties of the situation wherein the event may have occurred; and 3) form "expectations and make predictions" for future "actions or outcomes" " (Ross, p. 175). Thus, a brief analysis of some of the implications of attribution theory is appropriate here, particularly with regard to social inferences and prediction of outcomes.

The focus of attribution theory is generally on the bias inherent in the attribution process. That is, how can reasonably minded individuals consistently mis-perceive, mis-infer, and mis-predict events? Attempts have been made to delineate the sources of bias in attribution, and Ross (1977) has differentiated two discrete sources, motivational and nonmotivational bias.

Motivational bias refers to 'ego defensive' biases that individuals utilize to maintain or improve their general self-concept or ego syntonia. For example, at almost any competitive event, the loser can often be seen 'saving face' by commenting on the inadequacy of the referee. In such a case attributions are biased in a self-serving manner (Heider, 1958; Jones and Davis, 1965; Kelley, 1967).

Non-motivational bias refers to the "informational, perceptual, and cognitive factors that mediate and potentially distort attributional judgements 'in general'" (Ross, 1977, p. 183). Biases of this nature may relate to the gestalt perceptual process of closure, wherein the observer 'completes', 'fills in', or 'makes whole' an incomplete stimulus. The process by which the brain 'completes' an individual's visual receptive field, despite the presence of the blind spot (where the optic nerve leaves the retina), illustrates the closure phenomenon. Ross (1977) cites several examples of non-motivational bias, but

focuses on a single process which is directly relevant to this study.

> "The fundamental attribution error is the tendency for attributers to underestimate the impact of situational factors and to overestimate the role of dispositional factors in controlling behavior" (p. 183).

If the fundamental attribution error is as fundamental for the ordinary lay-person as Ross (1977) proposes, then its presence in the psychological community may account for the over-emphasis on personality traits and the neglect of situational variables in explaining and predicting behavior. It would account for the phenomenon mentioned by Bem and Allen (1974) and Mischel (1982). Specifically, the 'intuitive presence' of personality traits in the face of their 'empirical absence'. Certainly this process suggested by Ross (1977) may have contributed to over-attribution by psychologists of dispositional factors in determining behavior.

Although situational factors are generally underestimated, there are also instances and empirical support for the overestimation of environment as a behavioral determinant (Greene and Lepper, 1974; Lepper and Greene, 1975; Lepper, Greene, and Nisbett, 1973; Ross, 1977). In addition, a more recent study has provided

support for the notion that many personality researchers have overestimated the power of situational variables in producing behavior (Funder and Ozer, 1983). Therefore, it must be concluded that empirical support for Ross' (1977) proposed "fundamental attribution error" is not universal.

John Harvey and his Associates (Harvey, Town, and Yarkin, 1981), have attacked Ross' (1977) claims on a more logical and theoretical basis. Specifically, they point out two important errors in Ross' (1977) logic. First, they assert that his "attribution error" is indeed, not "fundamental" in nature. To support this they cite the theoretical logic underlying the "assignment of causality," and point to the fact that situational biases may be as 'fundamental' as dispositional biases (Harvey, et al., p. 347; see also Funder and Ozer, 1983 Ryle, 1963). Second, they argue that the concept of bias is not analogus to that of error. That is, bias may lead to accuracy and not necessarily error.

In summary, it should be concluded that Ross' (1977) hypothesis, though tenable, is not conclusively supported by data. Nor is it safe to conclude that the phenomenon he has outlined is either 'fundamental' or in 'error'. More suitably, the 'fundamental attribution error' could be re-named the 'equivocal attribution bias' and as such, its pervasive influence on the perceptual accuracy of

personologists is, if present at all, probably small.

Current Developments in the Person-situation Debate

Recently, Mischel and Peake (1982) have addressed two points relevant to the person-situation debate and this study. First, they reviewed and evaluated the success of several 'better methods' employed by researchers in an attempt to improve behavioral predictions from personality assessment. Second, they offered a theoretical explanation to account for the discrepancy which has been noted between intuitive beliefs and the research data (Bem and Allen, 1974; Mischel and Peake, 1982).

In a review of the better methods employed to improve personality coefficients, Mischel and Peake (1982) evaluated three major studies which they consider most promising. These included Bem and Allen (1974), Bem and Funder (1978), and Epstein (1979). Mischel and Peake's (1982) conclusion regarding this point was that these better methods were not successful in significantly improving the ability of researchers to validate the existence of cross-situational-behavior-consistency. In essence, they concluded that due to the deja vu nature of the consistency debate, future attempts at methodological refinements to improve personality coefficients are useless, as the most

promising 'better methods' have met with repeated failure. Thus, Mischel and Peake (1982) conclude that a theoretical reconceptualization of the consistency phenomenon is necessary.

Contrary to what one might expect, Mischel and Peake (1982) do not insist in their reconceptualization that cross-situational consistency in behavior cannot happen. Rather, they claim that usually what is intuitively called cross-situational-behavior-consistency, is actually the temporal stability of key behavioral features, all of which are depicting a similar trait (e.g., conscientiousness). Put another way. Mischel and Peake (1982) are proposing that as behavioral observers we (both psychologists and laypeople) misinterpret the temporal stability of key behaviors by assuming that these behaviors represent cross-situational-consistency. Therefore, just because a few key behaviors appear and re-appear over time, does not mean that they are occuring across situations.

In summary, Mischel and Peake's (1982) reconceptualization, while theoretically elegant, does not rule out the existence of cross-situation consistencies. Instead, they provide a theoretical conceptualization to account for the lack of observed cross-situational-consistency in behavior in the face of intuitive beliefs. Their reasoning is based on the

following logic.

> "The consistency debate has been aptly characterized as reflecting a continuous conflict between the findings of research and the convictions of our intuitions" (p. 752).
>
> "Bem and Allen (1974) concluded that 'in terms of the underlying logic and fidelity to reality, we believe that our intuitions are right; the research wrong'" (p. 752).
>
> "We believe that both the intuitions and the research have validity, but they are based on different data" (p. 752).
>
> "...we propose the intuitions about a person's consistency arise from the observations of temporal stability in prototypical behaviors. The error is to confuse the temporal stability of key behaviors or central features with pervasive cross-situational-consistency and then to overestimate the latter, a common tendency hardly confined to the layperson" (p. 752).

The conclusions that Mischel and Peake (1982) have stated in their article may be criticized for several reasons. First, their allusion that the 'better methods' have been all used up is strongly disputed. Methodology in personality assessment has been repeatedly criticized in the psychological literature and researchers have recently published creative refinements with promising results (see below). Therefore, Mischel and Peake's reconceptualization, while viable, is considered premature due to its strict exclusion of the possibility of methodological refinements when such possibility exists. Second, Mischel and Peake

(1982), as well as Ross (1977), assume that misinterpretation (or bias) necessarily depicts error, however, such is not always the case. And even if it were, the evidence presented by Mischel and Peake (1982) is not adequate to determine that a misinterpretation has actually occurred. Third, Mischel and Peake (1982), like Ross (1977), assume that mis-interpretations are always unidirectional. However, misinterpretations may also be bidirectional in nature (Funder and Ozer, 1983; Harvey et al., 1981). For example, one could also misinterpret cross-situational-consistency as merely the temporal stability of key behavioral features. Finally, their reconceptualization sounds somewhat similar to a phenomenon that dynamic theorists have termed 'coherence' in personality (Millon, 1981).

> "Such divergent extremes are viewed from a psychodynamic perspective, especially one that emphasizes the analysis of character, with an eye toward finding underlying unities, though these unities lie in the organizing role of conflict or apparent disunity" (Wachtel, 1973, p. 324).

Therefore, the cluster of key behavioral features (in Mischel's terminology) which represent a common trait, may be temporally stable only when taken individually, but cross-situationally-consistent when considered as a group.

Despite Mischel's theoretical reconceptualization, research on cross-situational-consistency in behavior is continuing. The presence of an interactionist conceptualization and/or Mischel's new conceptualization does not render research on personality and situational behavioral determinants anachronistic. Rather, it emphasizes the need for a more accurate and specific assessment procedure. A procedure which not only makes predictions, but also specifies the limits of those predictions as well. Much of the current research seems headed toward this end with particular attention being paid to methodological refinement in personality assessment. A review of some of the more promising efforts at increasing behavioral prediction rates from personality assessments follow.

Recently, Moskowitz (1982) has examined the old problems of coherence and cross-situational generality and has come up with some interesting findings. He claims that the research used to support the lack of coherence and cross-situational generality of personality constructs has not adequately tested such phenomena. Instead, he proposes a procedure through which personality constructs, e.g., dominance and dependency, are measured by sampling the occurrence of multiple referents of the construct in multiple situations. In other words, by looking at several

behaviors that represent a specific trait (referents) across several settings (situations) both coherence and cross-situational generality can be noted. Moskowitz then presents data wherein prediction coefficients from .42-.66 are achieved (which notably exceed the .30-.40 limit suggested by Mischel). As mentioned previously, such evidence certainly suggests that better methods still may be available to enhance the efficacy of personality measures. Additionally, and of particular interest to this study, Moskowitz (1982) points out that multiple regression analysis may be the preferred prediction technique available when one has "a theoretically defined construct with specifiable referents" (p. 764). Whereas factor analysis is the preferred method for determining global characteristics when the researcher lacks specific expectations regarding behavioral interrelations.

Monson, Hesley, and Chernick (1982) have also proposed theoretical-methodological advancements to improve the utility of personality constructs as behavioral predictors. They (Monson et al., 1982) contend that traits "can be used to predict behavior in some situations but that traits cannot be used to predict behavior in other situations" (p. 385). Consequently, they suggest that by assessing the strength of the situational pressures inherent in the setting where the behavior is being measured, researchers

(and clinicians) can specify when traits can and cannot predict behavior. Based on the empirical data from two studies:

> "traits are most likely to be useful in those settings where situational pressures are weak and where there are considerable individual differences in the behaviors exhibited. However, traits are least likely to be useful in those settings where situational pressures are strong and where there are few individual differences in the behaviors exhibited" (Monson et al., 1982, p. 397).

While the interactionist position presented by Monson et al. (1982) is not new to the psychological literature (Mischel, 1977; Endler and Magnusson, 1976), the specific findings in their study provide an important perspective from which previous research can be viewed. For example, most research studies expose individuals to strong situational stimuli which could account for the lack of relevance of personality traits in predicting behavior in these settings. Preferably, if traits are to be measured in their purest form, the subjects in a research project should be exposed to ambiguous stimuli where the situational pull is weak (e.g., the Rorschach, or the new non-verbal strategy employed in this study).

In another recent study, Funder and Ozer (1983) examined the influence of several well-known and important situational variables on behavior in terms generally reserved for the measurement of dispositional influence. Thus, Funder and Ozer (1983) produce a situation coefficient quite similar to the personality coefficient mentioned so often in the literature (Mischel, 1968). In this study four major social psychology experiments were examined. These experiments included Festinger and Carlsmith's (1959) study on attitude change under forced compliance. Darley and Batson's (1973) and Darley and Latane's (1968) studies on bystander intervention, and Milgram's (1975) study on obedience. In their examination of these four experiments, Funder and Ozer (1983) re-analyzed the data and produced situational coefficients to represent the situation's influence on behavior. Their findings were reported as comparable to typical personality or dispositional coefficients, ranging from .35-.42.

Subsequently, Funder and Ozer (1983) conclude the following:

> "Our several examples indicate that situational effects need not explain large percentages of the behavioral variance in order to be important; we suggest that this might also be true of person effects" (p. 111).

Additionally, and of importance to this study, Funder and

Ozer (1983) recommend that personality researchers follow at least three general rules. First, identify the influence of both situational and dispositional factors on behavior when studying the amount of behavioral variance contributed by either. Second, combine multiple measures of interrelated behaviors for prediction purposes. Third, utilize multiple regression techniques to combine the power of several behavioral predictors.

Concluding Introductory Comments and Hypotheses

In conclusion it is suggested that research on the influence of personality traits is still a necessary and worthwhile endeavor. The present study was an effort to further explore this area utilizing a number of tactics gleaned from the literature.

Four major approaches for improving behavioral predictions were used in this study. First, a strategy designed to discriminate between predictable and non-predictable subjects on the basis of extreme scores was utilized. This consisted of removing the lowest and highest 25% subjects scores on many of the measures from the whole sample and conducting regression analyses to asses the predictability of extreme scorers. Second, Monson et al's. (1982) recommendation of using behavioral tasks with low

stimulus or situational pull was included. It was hoped that by including such tasks, subjects' responses would reflect their underlying dispositions, rather than the situational demands. Third, a non-verbal behavioral approach to assessment was employed (Means and Harper, 1970). This measure was included in an attempt to quantify subjects' intraindividual variability via a new and different approach. Fourth, conventional self-report and peer-report approaches to assessment were also employed in an effort to measure different dimensions of the subjects' personalities (Funder, 1983). This 'convergent assessment' approach is conceptually similar to the approaches used to assess cognitive variables and lends itself well to multiple regression statistical analysis (Moskowitz, 1982; Wechsler, 1981).

Hypothesis 1a:

Non-verbal measurement will predict subsequent performance on the behavioral tasks more accurately than peer-report or self-report data.

Hypothesis 1b:

Peer-reports will yield higher prediction coefficients than self-report data.

Hypothesis 2a:

Non-verbal and peer-report combined will yield greater prediction coefficients than non-verbal combined with self-report and peer-report combined with self-report.

Hypothesis 2b:

Non-verbal and self-report combined will yield greater prediction coefficients than peer-report combined with self-report.

Hypothesis 2c:

All two measure combinations will yield significantly greater prediction coefficients than single measures alone.

Hypothesis 3:

Combined prediction equations utilizing non-verbal, peer-report, and self-report measures will yield more accurate predictions of subsequent behavior than any of the single measures or combined measures.

Hypothesis 4:

Prediction equations that utilize extreme scorers will account for a significantly larger amount of variation than prediction equations that utilize the entire subject sample.

Hypothesis 5:

Overall, the prediction equations that utilize all measures and the entire sample, will be greater than is typically found in the literature, i.e., $\underline{r} = .40$ or $\underline{R}^2 = 16\%$.

CHAPTER IV

METHOD

Subjects and Setting

Participants were 206 undergraduates enrolled in introductory psychology classes at the University of Montana. Subjects volunteered to receive six units of required experimental course credit. Of the 206 subjects, 129 were female and 77 were male. Subjects were assessed in rooms 218, 220, 242, and 304 of the Psychology/Pharmacy building on the University of Montana campus.

Measurement Devices and Materials

For each subject, materials included a pencil, 11 sheets of white typing paper (215 mm X 278 mm), two sheets of notebook paper (215 mm X 278 mm), the Personality Research Form (PRF), a 15 item demographics questionnaire, an imagery checklist, a sheet of 215 mm X 278 mm white paper with 13 mm and 35 mm lines drawn 46 mm apart, two copies of the Montana Personality Adjective Inventory (MPAI) and tables and chairs.

Design

A correlational design was used in this study to assess the relative contributions of four measurement approaches in predicting behavior. These approaches included traditional self-report (PRF and MPAI), peer-report (MPAI), and a non-verbal assessment device. Multiple regression equations were constructed using variables derived from the four measurement approaches to predict subject responses on 27 criterion variables.

Predictor Variables

The Personality Research Form (PRF) Form AA (Jackson, 1967).

This instrument, a multidimensional structured personality inventory, was developed by Jackson (1967) using Murray's (1938) personality theory as a foundation. Its construction was closely guided by psychometric theory, particularly that of Loevinger (1957), and is an an example of the construct approach to test construction (Wiggins, 1973). The PRF has been widely acclaimed for its sophisticated psychometric qualities (Anastasi, 1972; Kelley, 1972; Wiggins, 1972), and its use as a research instrument has increased over recent years. The measure is composed of twenty relatively homogeneous scales designed to tap Murray's (1938) needs, as well as two validity scales

for social desirability and random responding. Although the PRF is available in both short and long forms, the long form was utilized in this study. The PRF test manual suggests that scores of subjects be considered invalid when raw scores on the infrequency scale is four or greater. Scores at this level suggest that the subject has responded in a random or idiosyncratic manner. Therefore, subjects who scored four or above were eliminated from the data analysis.

The Means-Sommers Non-verbal Behavioral Personality Test.

This non-verbal battery was derived from Means' original work on spontaneous change (Means and Harper, 1970). The non-verbal tasks in this battery involve the subjects' drawing six circles on 215 mm X 278 mm white paper. The instructional set is identical for the first five drawings and varied for the final drawing (see Appendix E for specific instructions). Raw scores are obtained for a) the average circle size (first five circles); b) the standard deviation of the first five circle sizes; c) the average amount of movement between the first five circle placements; d) the standard deviation of circle movement; and e) the size of the world (sixth) circle.

While the utility of this measure has yet to be determined, it was hypothesized that circle variability measures would detect intraindividual variability differences between individuals. In other words, it was an attempt to quantify intraindividual variation as a personality trait (Fiske and Maddi, 1961). Previous research by Means (note 1, Means and Harper, 1970), suggests that such a construct is correlated with the length of time individuals will stay alone in a think tank. In addition, the circle size measures were hypothesized as potential indices of intrapersonal constriction and/or expansiveness.

The Montana Personality Adjective Inventory (Retzlaff, Scolatti, and Laughna, note 2).

The purpose of the Montana Personality Adjective Inventory (MPAI) is to provide a quick broad based assessment of personality traits. The MPAI was derived from the Personality Research Form and therefore is conceptually related to Murray's personality theory (1938). In this study, the test was not only used to assess the characteristics of an individual directly through self-report, but also via peer-report, where relatives or friends completed the checklist with respect to the subject's personality. The MPAI has not been used in such a

manner previous to this study.

The initial item pool for the MPAI was developed by abstracting the 15 adjectives from the PRF manual which were descriptive of high scorers on each scale. The items were then endorsed on a Likert scale by 112 subjects. After item-total correlations, the five most homogeneous items for each of the 20 scales were retained for the final form.

The final form of the the MPAI consists of 100 items (five adjectives for each of 20 scales), the Likert scale response instructions set and queries as to age and sex. It is scored by summing endorsements across the five adjectives of each scale. To avoid non-purposeful endorsement the 100 items were arranged in five columns with each column containing one adjective from each scale. To facilitate scoring, items within a scale are arranged on a diagonal with the first column containing the scales in alphabetical order and each loaded item one row lower for each column across the test form.

Reliability and validity data were gathered from another set of subjects. This group of 189 took the final form of the MPAI and PRF. Reliability ranged from .58 to .89. Reliability was assessed through the Cronbach alpha procedure. Of the 20 scales, 16 evidenced reliabilities of .70 or greater. The four weak scales were cognitive

structure (.58), defendence (.66), exhibition (.67), and understanding (.68). Particularly strong scales were aggression (.88) and order (.89).

Validity was defined as the correlation between each MPAI scale and the appropriate PRF scale. Validities ranged from .24 to .73. Of the 20 scales, six had correlations with their PRF counterpart of .40 or less. These were abasement (.24), autonomy (.35), change (.24), cognitive structure (.36), defendence (.31), and play (.27). Scales with validities of .60 or greater were dominance (.73), impulsivity (.65), nurturance (.64), order (.68), and succorance (.67).

Criterion Variables

The Checkerboard Task.

This task has been used previously in the literature as a method by which haptic and verbal cognitive styles in children could be differentiated (Lowenfeld, 1957). Subjects were given an instructional set regarding a specific drawing task (i.e., draw a checkerboard on a table) and timed with respect to task completion. Predictions as to the overall time taken to complete this task were generated from the preceding criterion variables.

The Imagery Task.

This task involved the exposure of each subject to two TAT pictures (cards 2, 17bm). Following each of these brief exposures, subjects were asked to form a mental image that was meaningful to them. The subjects were allowed approximately 60 seconds to construct their image. Subsequently, each subject was given a checklist to complete regarding his/her meaningful images. He/she was also asked to write a brief paragraph describing each image. The dimensions of interest on this task were: 1) subjects' rating of the activity, clarity, complexity, conflict, controllability, and intensity of their images; 2) the raw number of words used to describe the personally meaningful images.

The Two-Stick Task.

Subjects were shown a piece of 215 mm X 278 mm white paper with two lines (45 mm and 25 mm) arranged vertically on the paper. Subjects were then asked to draw five arrangements of two similar lines on five different sheets of 215 mm X 278 mm white paper. The only requirement was that the arrangements be 'pleasing' to the subject. The lines were scored on eight different dimensions. These included number of crosses (when lines crossed, as in the

letter "X"), number of touches (when lines touched, as the letter "T"), average distance apart, standard deviation of distance apart, average movement from original two lines, standard deviation of movement from original two lines, average sequential movement, and standard deviation of sequential movement.

Procedure

Six trained experimenters were employed to administer the personality measures and individual tasks. Initially, three groups of two experimenters met with and assessed three groups of 24 subjects. This session involved: 1) a general description of the experiment; 2) administration of the 15 item demographic questionnaire; 3) administration of the PRF, 4) administration of the MPAI; 5) instructions for the completion of the MPAI by a close friend or family member; and 6) scheduling of a 20-30 minute individual session.

During the second session experimenters met with each subject individually. This session consisted of: 1) receipt of the peer form of the MPAI; 2) completion of the Means-Sommers Non-Verbal Personality Test; 3) completion of the checkerboard assessment; 4) completion of the imagery task; 5) completion of the two-stick task; and 6) debriefing. Each experimenter observed and recorded the

responses of approximately 35 subjects for all of the tasks and kept track of the overall number of questions asked by subjects during the sessions. Finally, the subjects' received their experimental units prior to departing. See the appendices for instructional sets utilized during the administration of the personality assessments and behavioral tasks.

The Extreme Scorer Strategy.

The purpose of this strategy was to focus the statistical analyses on subjects who fell at the extremes on the personality assessments. Such subjects should be more predictable and analyses that focused specifically on this sub-sample were hypothesized to yield more accurate prediction equations (Alker, 1972; Levy, 1983; Sherman and Fazio, 1983).

The general criterion by which the extreme scorers were delineated was quartile selection. Subjects who scored in the upper and lower 25% on the personality measures were removed from the sample population for separate data analyses. Due to the distribution of scores on the personality measures the actual number of subjects included in these 'extreme score' analyses varied from about 40 to 55.

Training of the Experimenters.

Each experimenter involved in this study received six hours of training. This included five hours of group training and one hour of individual training. The training consisted of a review of the specific techniques followed when administering and scoring the assessments and tasks. The simple assessments and tasks were practiced by each experimenter on one another, while, more complex assessments and tasks were administered to a series of pilot subjects. During the final hour of training the experimenters practiced the entire routine on a pilot subject in the presence of the principle experimenter. In this way the administration and scoring of subjects' responses was standardized across experimenters.

RESULTS

Sample Demographics

Data were collected on a total of 206 subjects. Due to a number of factors, including attrition, questionnaires filled out incorrectly, and procedural errors by the experimenters 195 subjects were included in the final data analysis. This sample consisted of 123 females (63.1%) and 72 males (36.9%). The females ranged in age from 17 to 42 years ($\bar{x}$ = 19.22, s = 5.68), while the males ranged from 18 to 49 years ($\bar{x}$ = 21.94, s = 6.51).

Description of the Variables

There were 67 predictor and 27 criterion variables utilized in the primary set of multiple regression analyses. These variables are listed, along with their abbreviations in Table I. It should also be noted that criterion variables four through nine and 12 through 17 are non-behavioral measures., i.e., Likert-type ratings of the subject's image quality. Analyses were also conducted to determine the effects of experimenter, experimenter's sex, and subject's sex on the predictor and criterion variables.

Insert Table I about here.

Correlations Among Predictor Variables

Correlations among the predictor variables are summarized in Table II. As can be seen, the relationship between the self-report form of the Montana Personality Adjective Inventory (SMPAI) and the Personality Research Form (PRF) was fair at best. Correlations between the 20 SMPAI scales and their PRF counterparts ranged from .116 to .662. In contrast to the normative sample (Retzlaff et al., note 3), where only six of the 'validity coefficients' were noted to be below .40, 11 such correlations were found in this sample. Additionally, only three coefficients greater than .60 were noted (Dominance = .642; Exhibition = .623; Order = .662).

Insert Table II about here.

The correlations between the peer-report form of the MPAI (PMPAI) and the PRF were generally low. They ranged from .072 to .463. Nine of the 20 correlations did not reach a level of statistical significance (r = .181; df =

TABLE I

ABBREVIATIONS

Abbreviation	Definition
MPAI	Montana Personality Adjective Inventory
SMPAI	Self-Report form of MPAI
PMPAI	Peer-Report form of MPAI
PRF	Personality Research Form
Ab	Abasement
Ac	Achievement
Af	Affiliation
Ag	Aggression
Au	Autonomy
Ch	Change
Cs	Cognitive Structure
De	Defendence
Do	Dominance
En	Endurance
Ex	Exhibition
Ha	Harm Avoidance
Im	Impulsivity
Nu	Nurturance
Or	Order
Pl	Play
Se	Sentience
Sr	Social Recognition

TABLE I (continued)

ABBREVIATIONS

Abbreviation	Definition
Su	Succorance
Un	Understanding
In	Infrequency
Dy	Desirability
C-time	Time taken to complete checkerboard task
H-V	Haptic vs. Verbal orientation of checker-board drawing
Words-1	Number of words used to describe image #1
Int-1	Subject rating of amount of intensity present in image #1
Act-1	Subject rating of amount of activity present in image #1
Conf-1	Subject rating of amount of conflict present in image #1
Comp-1	Subject rating of amount of conflict in image #1
Clar-1	Subject rating of how clearly image #1 was seen
Cont-1	Subject rating of how controllable his/her image #1 was
Adds-1	Number of additional words needed for Subject to describe image #1
Words-2 to Adds-2	Number of additional words needed for Subject to describe image #1
# Cross	Number of times Subject crossed lines on two-stick task
# Touch	Number of times Subject touched lines together on two-stick task

TABLE I (continued)

ABBREVIATIONS

Abbreviation	Definition
Var-S	Standard deviation of distance of subject stick placement from original sticks
Var-x	Average deviation of subject stick placement from original sticks
Apart-s	Standard deviation of distance between subject's two sticks
Apart-x	Average distance between subject's two sticks
Moves-s	Standard deviation of amount of movement between successive stick placements
Moves-x	Average amount of movement between successive stick placements
Final Qs	Number of questions asked by subjects during administration of tasks
C-Size-s	Standard deviation of size differences between successive circle drawings
C-Size-x	Average size of circle
C-World	Size of circle drawn by subject for the world
C-Moves-s	Standard deviation of amount of movement between successive circle drawings
C-Moves-x	Average amount of movement between successive circle drawings
PV	Predictor variable
CV	Criterion Variable
S-Ab	Self-Report form of MPAI, scale Abasement
P-Ab	Peer-Report form of MPAI, scale Abasement

TABLE II

SIGNIFICANT CORRELATIONS AMONG PREDICTOR VARIABLES

	SMPAI/ PRF	PMPAI/ SMPAI	PRF/ PMPAI	PRF/ CIRCLES
Ab	.146	.223	.107	
Ac	.388	.331	.203	
Af	.434	.363	.237	
Ag	.522	.471	.318	
Au	.247	.413	.170	
Ch	.116	.316	.150	
Cs	.298	.337	.143	
De	.301	.090	.073	
Do	.642	.389	.423	
En	.433	.345	.194	
Ex	.623	.353	.379	
Ha	.382	.261	.273	
Im	.401	.410	.414	
Nu	.370	.152	.069	Nu/Size-x .181 Nu/World .213
Or	.662	.509	.463	
Pl	.361	.303	.162	
Se	.144	.279	.068	Se/Size-x .199
Sr	.363	.267	.072	

TABLE II (continued)

SIGNIFICANT CORRELATIONS AMONG PREDICTOR VARIABLES

	SMPAI/ PRF	PMPAI/ SMPAI	PRF/ PMPAI	PRF/ CIRCLES
Su	.523	.359	.261	
Un	.454	.352	.218	
In				
Dy				

df = 192; r = .181, p < .01; r = .145, p < .05.

Note: Only correlations that are significant at the p < .01 level are listed for the circle test.

192; $p < .01$). Only four of the peer-report scales had correlations with their counterpart PRF scales greater than .40 (Dominance = .423; Impulsivity = .414; Order = .463).

Correlations between the peer- and self- report forms of the MPAI were also quite low. They ranged from .090 to .509. While 18 of these correlations were significant at the $p < .01$ level. they were generally of modest size (i.e., $r = .22$; to $r = .36$). Four of the correlations were greater than .40 (Aggression = .471; Autonomy = .413; Impulsivity = .410; Order = .509).

Given the unusual nature of the non-verbal measure, and the generally low correlations among the PRF and MPAI subscales, it is not surprising that there were few significant correlations between it and the other measures. Three such correlations were noted. They were PRF-Nu/Size-x = .181; PRF-Nu/World = .213; PRF-Se/Size-x = .199. No correlations were found between the non-verbal measures and the MPAI measures at the $p < .01$ level.

Correlations Between Sex of Subject and Predictor Variables

There were several significant correlations noted between sex of subject and predictor variables. On the SMPAI females tended to score higher on the Su subscale ($r = .250$). On the PRF, there were six notable sex differences.

Females tended to score higher on the Af. Ha. Nu, and Su subscales (Af = .280; Ha = .293; Nu = .353; Su = .327). They also tended to score lower on the Au and De subscales (Au = -.266; De = -.256). On the non-verbal measure, females tended to draw larger circles for the World (r = .250). See Table III for a summary of these results.

Insert Table III about here.

Experimenter Effects

Analyses were conducted to determine if there were experimenter effects for subject's performance on the criterion variables. This was particularly important because the criterion tasks, as well as the circle test were completed during individual sessions with six different experimenters. There were not any significant experimenter effects with respect to either predictor or criterion variables. The largest correlation found was r = .282, df = 30, $p > .05$.

Predictor/Criterion Variable Correlations

TABLE III

SIGNIFICANT CORRELATION COEFFICIENTS BETWEEN SEX OF SUBJECT AND PREDICTOR VARIABLES

Predictor Variables	r
*S-Su	.250
*PRF-Af	.280
*PRF-Au	-.266
*PRF-De	-.256
*PRF-Ha	.293
**PRF-Nu	.353
**PRF-Su	.327
*World	.250

Note: Positive correlations indicate a tendency for females to obtain higher raw scores.

*$p < .05$, $df = 70$

**$p < .01$, $df = 70$

Of the 1809 correlation coefficients computed between predictor and criterion variables, 63 were significant at the $p < .01$ level. These correlations ranged from $r = .181$ to $r = .346$. Overall, 25 significant correlations were produced by correlating the SMPAI with the criterion variables; 16 by correlations that utilized the PRF; 12 by the circle (non-verbal) measure; and 10 by the PMPAI. These correlations are displayed in Table IV.

In order to determine whether certain types of predictor variables were more significantly correlated with certain types of criterion variables, t-tests between dependent r's were computed (Cohen and Cohen, 1975). These t-tests indicated that, in general, differences between the correlation coefficients were non-significant. However, there were some exceptions to this general finding. For example, the 'best' correlation between a verbal self-report measure and a verbal self-report criterion measure was significantly greater than the 'best' correlation produced by a non-verbal measure with the same criterion variable (PRF-Dy/Clar-2, $r = .252$; Moves-s/Clar-2, $r = -.047$; $t = 2.10$, $df = 192$, $p < .05$). Similarly, a non-verbal predictor showed a significantly greater correlation with a non-verbal criterion variable than the 'best' correlation provided by a verbal self-report measure for the same criterion (C-Moves-x/Moves-x, $r = .346$; PRF-Un/Moves-x, $r = .144$, $t =$

2.17, df = 192, p < .05). While these results are exceptions in terms of their statistical significance, they are consistent with the overall trend revealed by visual inspection of Table IV. That is, self- or peer- report predictor measures tended to correlate more strongly with verbal self-report criterion variables, while, non-verbal predictor measures tended to correlate more strongly with conceptually similar non-verbal criterion variables.

Insert Table IV about here.

Whole Sample Prediction Equations

Using the 67 predictor variables, regression equations were constructed to predict subject responses on the criterion tasks. The Minitab (Ryan, Joiner, and Ryan, 1976) stepwise regression procedure was used to build the prediction equations (Cohen and Cohen, 1975; Pedhazur, 1982).

With a criterion of F = 4.5 for entering variables and F = 4.0 for removal, over 200 stepwise regression calculations were performed. From these calculations, approximately 60 different prediction equations were found

TABLE IV

CORRELATION COEFFICIENTS FOR

PREDICTION/CRITERION VARIABLES

	CV	PV	r-value
1)	C-time	None	N.S.
2)	Hap/Verb	PRF-Ch	.190
		PRF-Un	.186
3)	Words-1	S-Ac	.193
4)	Int-1	S-Ac	.213
		S-Cs	.228
		S-DO	.256
5)	Act-1	S-Do	.228
6)	Conf-1	None	N.S.
7)	Comp-1	S-Ac	.292
		S-En	.237
		S-Se	.259
		S-Un	.221
		P-Cs	.195
		PRF-Ac	.271
		PRF-En	.251
		PRF-Un	.230
8)	Clar-1	SMPAI-Au	.185
		SMPAI-Un	.202
		PMPAI-Ac	.217
		PMPAI-En	.196
		PRF-Ac	.203
		PRF-En	.228
9)	Cont-1	None	N.S.
10)	Adds-1	None	N.S.
11)	Words-2	SMPAI-Se	.206
12)	Int-2	None	N.S.

TABLE IV (continued)

CORRELATION COEFFICIENTS FOR

PREDICTION/CRITERION VARIABLES

	CV	PV	r-value
13)	Act-2	PMPAI-Af	.194
		PMPAI-Nu	.198
14)	Conf-2	SMPAI-Au	.212
		SMPAI-Ch	.209
		SMPAI-Se	.209
		SMPAI-Un	.232
15)	Comp-2	SMPAI-Un	.204
		PRF-Ac	.219
		PRF-Do	.213
		PRF-En	.196
16)	Clar-2	SMPAI-Ab	-.232
		SMPAI-Ac	.241
		PRF-Ac	.250
		PRF-En	.236
		PRF-Dy	.252
17)	Cont-2	SMPAI-Ab	-.185
		SMPAI-Ch	-.246
		SMPAI-Su	-.227
		PMPAI-Cs	.194
		PMPAI-Sr	.211
		PMPAI-Un	.195
		PRF-Sr	-.196
		C-World	-.214
18)	Adds-2	C-Size-s	.232
19)	# Cross	None	N.S.
20)	# Touch	PMPAI-Sr	-.188
		PMPAI-Un	-.210
21)	Var-s	SMPAI-Un	.187
		C-Size-s	.334
22)	Var-$\bar{x}$	C-Size-s	.315
		C-Move-s	.200

TABLE IV

CORRELATION COEFFICIENTS FOR

PREDICTION/CRITERION VARIABLES

	CV	PV	r-value
23)	Apart-s	SMPAI-Un	.257
		PRF-Sr	-.190
		C-Size-s	.315
		C-Move-$\bar{x}$	.205
24)	Apart-$\bar{x}$	C-Size-s	.259
25)	Moves-s	SMPAI-Un	.238
		PRF-Se	.198
		C-Size-s	.281
		C-Move-$\bar{x}$	.228
26)	Moves-$\bar{x}$	C-Size-s	.343
		C-Move-$\bar{x}$	.346
27)	Final Qs	None	N.S.

Note: $p < .01$, $df = 192$ for all correlations.

to have an F statistic at $p < .01$. For the sake of brevity and convenience, only prediction equations that account for more than 6.0% of the variance are included in Table V. In addition, only equations that account for greater than 10.0% and 15.0% of the variance are included in Tables VI and VII, respectively. Although these equations are of statistical significance, they are not necessarily clinically significant or clinically useful.

Hypothesis 1a

It was predicted that non-verbal measurement would yield prediction equations of greater statistical significance than peer- or self-report measures. As can be noted by examining Table V, this hypothesis received some tentative support. The R^2 statistic reveals that the prediction equations accounting for the largest amounts of variance are composed of non-verbal predictor variables. While this finding was generally true with respect to the two-stick behavioral criteria, the inverse was found with respect to the self-report criterion measures (subjects' self-ratings of image quality). Thus, the hypothesis was not supported when criterion variables of a verbal nature were considered. Only with respect to conceptually similar non-verbal criterion variables did the non-verbal prediction measures manage to yield the most accurate prediction

equations.

Insert Table V about here.

Hypothesis 1b

It was predicted that the PMPAI would provide significantly more accurate prediction equations than self-report measures (SMPAI, PRF). This hypothesis was not supported by the data. Table V shows that only two of the 15 best regression equations derived from single measures utilize the peer-report predictor variables. In contrast, self-report predictor variables are used in 10 of the 15 best single measure equations (SMPAI = 5, PRF = 5).

Hypothesis 2a

It was predicted that the combination of non-verbal and peer-report measures would produce prediction equations significantly more accurate that non-verbal and self-report measures combined, or self- and peer-report measures combined. As can be seen in Table VI, this hypothesis was not supported by the data. Only one of the 19 best regression equations constructed from two measure combinations was produced by the peer-report/non-verbal

TABLE V

PREDICTION EQUATIONS FROM INDIVIDUAL MEASURES

CV/Type of Measure	R^2
1) C-time/n.a.	< 6.0%
2) H-V/PRF	6.2% (F =7.43; df = 2,192; p < .01) $\hat{Y}$ = 1.03 + .0310(Ch) + .0287(Ab) s = .4766
3) Words-1/n.a.	< 6.0%
4) Int-1/n.a.	< 6.0%
5) Act-1/SMPAI	7.4% (F = 8.74; df = 2,192; p < .01) $\hat{Y}$ = 3.01 + .0823(Do) - .0588(Ex) s = 1.30
6) Conf-1/n.a.	< 6.0%
7) Comp-1/n.a.	< 6.0%
8) Clar-1/PMPAI	8.3% (F = 6.85; df =3,191; p < .01) $\hat{Y}$ = 2.95 + .0496 (Ac) + .0310(Au) - .0300(Su) s = .8952
9) Cont-1/n.z.	< 6.0%
10) Adds-1/n.a.	< 6.0%
11) Words-2/n.a.	< 6.0%
12) Int-2/n.a.	< 6.0%
13) Act-2/PMPAI	6.2% (F = 7.46; df = 2,192; p < .01) $\hat{Y}$ = 2.24 + .0663 (Nu) - .0393(Do) s = 1.165
14) Conf-2/SMPAI	8.1% (F = 9.56; df = 2,192; p < .01) $\hat{Y}$ = -.404 + .0624(Un) + .0415(Ch) s = 1.17
15) Comp-2/PRF	6.8% (F = 8.11; df = 2,192; p < .01) $\hat{Y}$ = 1.83 + .0670(Un) + .0388(Do) s = 1.106
16) Clar-2/PRF	11.2% (F = 9.12 df = 3,191; p < .01) $\hat{Y}$ = 2.47 + .126(Dy) - .0672(Af) + .0413(En) s = 1.032

TABLE V (continued)

PREDICTION EQUATIONS FROM INDIVIDUAL MEASURES

CV/Type of Measure	R^2	
16) Clar-2/SMPAI	8.5%	(F = 9.96, df = 192,2; p < .01) $\hat{Y}$ = 3.27 + .0519(Ac) - .0395(Ab) s = 1.047
17) Cont-2/n.a.	< 6.0%	
18) Adds-2/PRF	7.2%	(F = 5.98; df = 3,191; p < .01) $\hat{Y}$ = 9.92 - .333(Cs) - .256(P1) - .222(Au) s = 4.046
19) # Cross/PRF	9.3%	(F = 5.96; df = 4,190; p < .01) $\hat{Y}$ = .319 - .0695(Nu) = .0774(Ch) - .045(Ag) + .0413 (Cs) s = .8347
20) # Touch/n.a.	< 6.0%	
21) Var-s/Circles	12.6%	(F = 14.93; df = 2,192; p < .01) $\hat{Y}$ = 16.5 + .463(Size-s) = .171(Moves-$\bar{x}$) s = 27.77
22) Var-$\bar{x}$/Circles	12.2%	(F = 14.51; df = 2,192; p < .01) $\hat{Y}$ = 65.7 + .612(Size-s) + .302(Moves-$\bar{x}$) s = 41.73
23) Apart-s/SMPAI	8.0%	(F = 9.47; df = 2,192; p < .01) $\hat{Y}$ = -13.2 + 1.7(Un) + .804(Ac) s = 26.37
24) Apart-$\bar{x}$/n.a.	< 6.0%	
25) Moves-s/SMPAI	9.1%	(F=7.47; df = 3,191; p < .01) $\hat{Y}$ = -16.9 + 2.32(Un) - 1.44(Su) 1.24(Ab) s = 37.69
26) Moves-$\bar{x}$/Circles	18.4%	(F = 15.55; df = 3,191; p < .01) $\hat{Y}$ = 41.1 + 1.14(Moves-$\bar{x}$) + .989(Size-s) - 1.12(Moves-s) s = 63.74
27) # Qs/n.a.	< 6.0%	

Note: All R^2 values are adjusted for degrees of freedom.

combination. This suggests, contrary to the hypothesis, that the peer-report/non-verbal combination resulted in less accurate predictions of the criterion variables. In addition, the amount of variance accounted for by this single prediction equation was 14.1%, which, was approximately average with respect to the amount of variance accounted for by the rest of the two measure combinations (i.e., the $\underline{R}^2$ value ranged from 10.2% to 21.7% for the other two measure combinations).

Hypothesis 2b

It was predicted that the combination of non-verbal and self-report measures would yield significantly more accurate prediction equations than the combination of self- and peer-report measures. Again, this hypothesis was not supported by the data (see Table VI). In fact, there were no two measure combinations that demonstrated a clear superiority over other two measure combinations.

Insert Table VI about here.

Hypothesis 2c

TABLE VI

PREDICTION EQUATIONS DERIVED FROM

TWO MEASURE COMBINATIONS

CV/Types of Measure	R^2
1) C-time/n.a.	< 10.0%
2) H-V/n.a.	< 10.0%
3) Words-1/n.a.	< 10.0%
4) Int-1/ SMPAI + PMPAI	11.5% (F = 13.59; df = 2,192; p < .01)
5) Act-1/ SMPAI + PMPAI	10.2% (F + 12.06; df = 2,192; p < .01)
6) Conf-1/n.a.	< 10.0%
7) Comp-1/ PMPAI + PRF	14.5% (F = 7.60; df = 5,189; p < .01)
7) Comp-1/ SMPAI + PMPAI	13.6% (F = 8.64; df = 4,190; p < .01)
8) Clar-1/ SMPAI + PMPAI	10.9% (F = 6.91; df = 4,190; p < .01)

4) $\hat{Y}$ = 3.55 + .0630(S-Do) - .0551(P-Ex)

s = 1.068

5) $\hat{Y}$ = 3.55 + .0689(S-Do) - .0664(P-Ex)

s = 1.285

7) $\hat{Y}$ = 1.70 + .0767(PRF-Dy) + .0545(P-Cs) - .0481 (P-Ex) + .0449(P-Au) - .0342(P-Su)

s = 1.109

7) $\hat{Y}$ = 1.58 + .0776(S-Ac) - .0382(P-Pl) + .0489(P-Cs) - .0337(P-Su)

s = 1.115

8) $\hat{Y}$ = 2.64 + .0550(P-Ac) + .0261(S-Au) - .0377(P-Su) + .0294(P-Ch)

s = .8826

TABLE VI (continued)

PREDICTION EQUATIONS DERIVED FROM

TWO MEASURE COMBINATIONS

CV/Types of Measure	R^2
9) Cont-1/n.a.	< 10.0%
10) Adds-1/n.a.	< 10.0%
11) Words-2/n.a.	< 10.0%
12) Int-2/n.a.	< 10.0%
13) Act-2/n.a.	< 10.0%
14) Conf-2/ SMPAI + PRF	17.0% (F = 7.62; df = 6,188; p < .01)
$\hat{Y}$ = 1.57 + .0419(S-Un) - .104(PRF-Dy) + .0846 (S-Se) - .0823(S-Sr) + .0527(S-Ha) - .0607 (PRF-Ab)	
s = 1.111	
15) Comp-2/n.a.	< 10.0%
16) Clar-2/ SMPAI + PRF	17.3% (F + 7.78; df = 6,188; p < .01)
$\hat{Y}$ = 2.10 + .123(PRF-Dy) - .0637(PRF-Af) - .0455 (S-Ab) + .0675(PRF-Ab) + .0385(S-Au) + .0455(PRF-Cs)	
s = .9951	
17) Cont/SMPAI + Circles	10.9% (F = 8.95; df = 3,191; p < .01)
$\hat{Y}$ = 5.15 - .0365(S-Ch) - .0049(World) - .0362 (S-Su)	
s = 1.12	
18) Adds-2/n.a.	< 10.0%
19) # Cross/n.a.	< 10.0%

TABLE VI (continued)

PREDICTION EQUATIONS DERIVED FROM

TWO MEASURE COMBINATIONS

CV/Types of Measure	R^2	
20) # Touch/n.a.	< 10.0%	
21) Var-s/PRF + Circles	15.0%	(F = 12.41; df = 3,191; p < .01)
$\hat{Y}$ = 25.2 + .475(Size-s) - 1.12(Ha) + .169(Moves-$\bar{x}$)		
s = 27.38		
21) Var-s/PMP + Circles	14.1%	(F = 11.64; df = 3,191; p < .01)
$\hat{Y}$ = 31.6 + .479(Size-s) + .160(Moves-$\bar{x}$) - .609(Or)		
s = 27.52		
22) Var-$\bar{x}$/PRF + Circles	17.0%	(F = 10.92; df = 4,190; p < .01)
$\hat{Y}$ = 60.7 + .647(Size-s) - 1.72(Ha) + .307(Moves-$\bar{x}$) + 2.24(De)		
s = 40.58		
23) Apart-s/ SMPAI + Circles	15.5%	(F = 12.85; df = 3,191; p < .01)
$\hat{Y}$ = -13.1 + .461(Size-s) + 1.44(Un) - .785(Su)		
s = 25.28		
23) Apart-s/ PRF + Circles	12.5%	(F = 14.92; df = 2,192; p < .01)
$\hat{Y}$ = 21.6 + .505(Size-s) - 1.37(Sr)		
s = 25.72		
24) Apart-$\bar{x}$/SMPAI + Circles	12.1%	(F = 9.89; df = 3,191; p< .01)
$\hat{Y}$ = 17.1 + .372(Size-s) + 1.44(Au) - 1.21(Ch)		
s = 24.86		
24) Apart-$\bar{x}$/ SMPAI + PMPAI	10.8%	(F = 5.70; df = 5,189; p < .01)

TABLE VI (continued)

PREDICTION EQUATIONS DERIVED FROM

TWO MEASURE COMBINATIONS

CV/Types of Measure	R^2
$\hat{Y}$ = 4.51 + .699(S-Un) + .773(P-De) - .823(S-De) + 1.36(S-Au) - .921(S-Ch)	
s = 25.04	
25) Moves-s/ SMPAI + PRF	15.1% (F = 6.77; df = 6,188; p < .01)
$\hat{Y}$ = 13.3 + 2.27(S=Un) - 2.07(S-Su) + 2.88(PRF-Su) - 2.06(PRF - Ha) - 2.03(PRF-Pl + 1.11(S-Ab)	
s = 36.41	
25) Moves-s/ SMPAI + Circles	15.0% (F = 9.57; df = 4,190; p < .01)
$\hat{Y}$ = -17.7 + .586(Size-s) + 1.99(S-Un) - 1.46(S-Su) + 1.23(S-Ab)	
s = 36.44	
26) Moves-$\bar{x}$/PRF + Circles	21.7% (F = 11.76; df = 5,189; p < .01)
$\hat{Y}$ = 105.0 + 1.08(Moves-$\bar{x}$) + .950(Size-s) - .950 (Moves-s) - 2.93(Ha) - 3.12(Pl)	
s = 62.41	
26) Moves-$\bar{x}$/SMPAI + Circles	20.0% (F = 13.15; df = 4,190; p < .01)
$\hat{Y}$ = 80.8 + 1.10(Moves-$\bar{x}$) + 1.02(Size-s) - 1.11 (Moves-s) - 1.92(Su)	
s = 63.08	
27) # Qs/n.a.	< 10.0%

Note: All R^2 values are adjusted for degrees of freedom.

It was predicted that the regression equations derived from two measure combinations, e.g., peer-report/self-report, non-verbal/peer-report, etc., would be significantly more accurate than predictions derived from single measures alone. Perusal of the data in Table V and Table VI reveals that this hypothesis was generally supported in a number of ways. First, two measure combinations tended to produce regression equations with larger $\underline{R}^2$ values than single measures. For example, two measure combinations produced 21 regression equations with $\underline{R}^2$ > 10.0%. In contrast, only three such equations were produced by single measures alone. Second, in nine cases (criterion variables, 5,8,14,16,21-23,25,26) where single measure and two measure combinations are directly comparable, the two measure combinations yield higher $\underline{R}^2$ values as well as a smaller sample standard error of $\hat{Y}$ estimated from X ($s_{y.x}$). Third, in the nine case cited above, adding a second predictor measure tends to produce additional regression coefficients that account for significant amounts of variation (variation not accounted for by single measures alone). Table VII provides a side by side comparison of the nine comparable cases mentioned above.

Insert Table VII about here.

TABLE VII

REGRESSION COEFFICIENTS FOR SELECTED 1 AND 2 MEASURE PREDICTION EQUATIONS

	CV	PV	COEFF	SD/ COEFF	t-RATIO	R^2
5)	Act-1	S-Do	.0823	.0197	4.17	
		S-Ex	-.0588	.0229	- 2.57	7.4%
5)	Act-1	S-Do	.0689	.0165	4.17	
		P-Ex	-.0664	.0185	-3.59	10.2%
8)	Clar-1	P-Ac	.0496	.0144	3.46	
		P-Au	.0310	.0126	2.47	
		P-Su	-.0300	.0124	-2.42	8.3%
8)	Clar-1	P-Ac	.0550	.0147	3.75	
		S-Au	.0261	.0122	2.14	
		P-Su	-.0377	.0127	-2.96	
		P-Ch	.0294	.0132	2.23	10.9%
14)	Conf-2	S-Un	.0624	.0198	3.15	
		S-Ch	.0415	.0149	2.78	8.1%
14)	Conf-2	S-Un	.0419	.0231	1.81	
		PRF-Dy	-.1043	.0338	-3.09	
		S-Se	.0846	.0271	3.11	
		S-Sr	-.0823	.0236	-3.48	
		S-Ha	.0527	.0196	2.69	
		PRF-Ab	-.0607	.0251	-2.41	17.0%
16)	Clar-2	PRF-Dy	.1260	.0336	3.74	
		PRF-Af	-.0672	.0255	-2.63	
		PRF-En	-.0413	.0193	2.14	11.2%
16)	Clar-2	PRF-Dy	.1230	.0329	13.74	
		PRF-Af	-.0637	.0247	-2.58	
		S-Ab	-.0455	.0146	-3.13	
		PRF-Ab	.0675	.0226	2.98	
		S-Au	.0385	.0140	2.74	
		PRF-Cs	.0454	.0199	2.28	17.3%
21)	Var-s	Size-s	.463	.1280	3.62	
		Move-$\bar{x}$	.171	.0754	2.26	12.6%
21)	Var-s	Size-s	.475	.1263	3.76	
		PRF-Ha	-1.12	.4384	-2.55	
		Moves-$\bar{x}$	.169	.0743	2.28	15.0%

TABLE VII (continued)

REGRESSION COEFFICIENTS FOR SELECTED 1 AND 2 MEASURE PREDICTION EQUATIONS

	CV	PV	COEFF	SD/ COEFF	t-RATIO	R^2
22)	Var-$\bar{x}$	Size-s	.612	.1927	3.18	
		Moves-$\bar{x}$	.302	.1133	2.67	12.2%
22)	Var-$\bar{x}$	Size-s	.647	.1873	3.46	
		PRF-Ha	-1.72	.6505	-2.64	
		Moves-$\bar{x}$	.307	.1102	2.78	
		PRF-De	2.24	-.9621	2.33	17.0%
23)	Apart-s	S-Un	1.70	.4456	3.81	
		S-Ac	.804	.3598	-2.24	8.0%
23)	Apart-s	Size-s	.461	.1075	4.29	
		S-Un	1.44	.4317	3.33	
		S-Su	-.785	.3448	-2.28	15.5%
25)	Moves-s	S-Un	2.32	.6374	3.64	
		S-Su	-1.44	.5322	-2.71	
		S-Ab	1.24	.5244	2.36	9.1%
25)	Moves-s	S-Un	2.27	.6291	3.61	
		S-Su	-2.07	.5965	-3.47	
		PRF-Su	2.88	.8450	3.41	
		PRF-Ha	-2.06	.6822	-3.02	
		PRF-Pl	-2.03	.8440	-2.41	
		S-Ab	1.11	.5104	2.17	15.1%
26)	Moves-$\bar{x}$	Moves-$\bar{x}$	1.14	.2717	4.19	
		Size-s	.989	.2938	3.37	
		Moves-s	-1.12	.4367	-2.57	18.4%
26)	Moves-$\bar{x}$	Moves-$\bar{x}$	1.08	.2668	4.04	
		Size-s	.950	.2893	3.28	
		Moves-s	-.950	.4313	-2.20	
		PRF-Ha	-2.93	1.044	-2.81	
		PRF-Pl	-3.12	1.397	-2.24	21.7%

Note: All R^2 values are adjusted for degrees of freedom.

Hypothesis 3

It was predicted that prediction equations derived from three-measure combinations, i.e., self-report, peer-report, and non-verbal would provide significantly better predictions than the single measures, or combined measures (two-measure predictions). Table VIII shows the prediction equations with three different predictor measures that accounted for greater than 15.0% of the variation on criterion measures. Six such prediction equations were produced. As can be seen in Table VI, the various two-measure combinations produced nine such prediction equations (that accounted for at least 15.0% of the variance). That does not suggest that two-measure predictions were actually more accurate than three-measure predictions, as each of the three-measure prediction equations listed account for a greater amount of variation than their related two-measure prediction equations. However, the improvement in prediction efficiency is of questionable significance. In addition, the increasing number of predictor variables (at times as many as six) involved in the regression equations for three-measure predictions cause their interpretation to be complex and unweildy. Therefore, while the data are somewhat supportive of this hypothesis, they appear to be non-supportive in terms of practical utility and efficiency (see Table IX).

Insert Tables VIII and IX about here.

Hypothesis 4

It was predicted that the accuracy of prediction equations would improve significantly when only extreme scores on the various predictor measures were included in the analysis. To test this hypothesis, regression equations were constructed using the highest and lowest 25% scorers on some of the various predictor variables. A rational-intuitive approach was utilized to select the variables that were most likely to moderate the subjects' responses to the criterion measures. Using a cutoff of R = 20%, Table X includes the two best prediction equations involving extreme scores for each of the 27 criterion variables. This approach accounted for at least 20% of the variation in the prediction of all but two of the criterion variables.

Insert Table X about here.

Because the use of extreme scores reduces the sample size. it is difficult to directly compare the accuracy of such a procedure with the whole sample analyses. As Pedhazur (1982, p. 65) notes, it "might" be satisfactory to

TABLE VIII

PREDICTION EQUATIONS DERIVED FROM

THREE MEASURE COMBINATIONS

CV/Types of Measures	R^2	
1) C-Time/n.a.	< 15.0%	
2) H-V/n.a.	< 15.0%	
3) Words-1/n.a.	< 15.0%	
4) Int-1/n.a.	< 15.0%	
5) Act-1/n.a.	< 15.0%	
6) Conf-1/n.a.	< 15.0%	
7) Comp-1/ PMPAI + PRF + Circles	19.9%	(F = 7.58; df = 6,188; p < .01)
$\hat{Y}$ = 1.59 + .0794(PRF-Ac) + .0115(Moves-s) + .0529 (P-Cs) - .0503(P-Ex) + .0434(P-Au) - .0327 (P-Su)		
s = 1.093		
8) Clar-1/n.a.	< 15.0%	
9) Cont-1/n.a.	< 15.0%	
10) Adds-1/n.a.	< 15.0%	
11) Words-1/n.a.	< 15.0%	
12) Int-1/n.a.	< 15.0%	
13) Act-2/n.a.	< 15.0%	
14) Conf-2/n.a.	< 15.0%	
15) Comp-2/n.a.	< 15.0%	
16) Clar-2/ SMPAI + PMPAI + PRF	17.9%	(F = 7.03; df = 7,187; p < .01)

TABLE VIII (continued)

PREDICTION EQUATIONS DERIVED FROM

THREE MEASURE COMBINATIONS

CV/Types of Measures	R^2
$\hat{Y}$ = 2.37 + .106(PRF-Dy) - .0378(PRF-Pl) + .0463 (P-Au) - .0439(S-Ab) + .0618(PRF-Ab) - .0428 (P-Im) + .0328(S-Au) s = .9919	
17) Cont-2/n.a.	< 15.0%
18) Adds-2/n.a.	< 15.0%
19) # Cross/n.a.	< 15.0%
20) # Touch/n.a.	< 15.0%
21) Var-s/SMPAI + PMPAI + Circles	19.8% (F = 9.00; df = 6,188; p < .01)
$\hat{Y}$ = 44.2 + .466(Size-s) + .132(Moves-$\bar{x}$) - .727 (P-Or) - 1.26(S-Im) + 1.19(S-Un) - .883(S-Ha) s = 26.59	
22) Var-$\bar{x}$/PMPAI + PRF + Circles	18.6% (F = 9.87; df = 5,189; p < .01)
$\hat{Y}$ = 101.0 + .69(Size-s) - 1.79(PRF-Ha) + .303 (Moves-$\bar{x}$) + 2.40(PRF-De) - 1.54(P-Se) s = 40.18	
23) Apart-s/SMPAI + PMPAI + Circles	17.3% (F = 11.13; df = 4,190; p< .01)
$\hat{Y}$ = -23.0 + .46(Size-s) + 1.36(S-Un) - .917(S-Su) + .839(P-De) s = 25.01	
24) Apart-s/SMPAI + PRF + Circles	16.4% (F = 13.65, df = 3,191, p < .01)

TABLE VIII (continued)

PREDICTION EQUATIONS DERIVED FROM

THREE MEASURE COMBINATIONS

CV/Types of Measures	$\underline{R}^2$
$\hat{Y} = -12.8 + .458(\text{Size-s}) + 1.34(\text{S-Un}) - 1.29(\text{PRF-Sr})$	
$\underline{s} = 25.15$	
24) Apart-$\bar{x}$/n.a.	< 15.0%
25) Moves-s/n.a.	< 15.0%
26) Moves-$\bar{x}$/n.a.	< 15.0%
27) # Qs/n.a.	< 15.0%

Note: All $\underline{R}^2$ values are adjusted for degrees of freedom.

TABLE IX

REGRESSION COEFFICIENTS FOR SELECTED 2 AND 3 MEASURE PREDICTION EQUATIONS

CV	PV	COEFF	SD/ COEFF	t-RATIO	R^2
7) Comp-1	PRF-Dy	.0767	.02393	3.20	
	P-Cs	.0545	.01960	2.78	
	P-Ex	-.0481	.01692	-2.84	
	P-Au	.0449	.01694	2.65	
	P-Su	-.0342	.01552	-2.20	14.5%
7) Comp-1	PRF-Ac	.0794	.02362	3.36	
	Move-s	.0115	.004548	2.52	
	P-Cs	.0529	.01934	2.74	
	P-Ex	-.0503	.01671	-3.01	
	P-Au	.0434	.01671	2.59	
	P-Su	-.0327	.01532	-2.13	16.9%
16) Clar-2	PRF-Dy	.1230	.0329	13.74	
	PRF-Af	-.0637	.0247	-2.58	
	S-Ab	-.0455	.0146	-3.13	
	PRF-Ab	.0675	.0226	2.98	
	S-Au	.0385	.0140	2.74	
	PRF-Cs	.0454	.0199	2.28	17.3%
16) Clar-2	PRF-Dy	.106	.03002	3.53	
	PRF-Pl	-.0378	.02261	-1.67	
	P-Au	.0463	.01732	2.67	
	S-Ab	-.0439	.01452	-3.02	
	PRF-Ab	.0618	.02254	2.74	
	P-Im	-.0428	.01700	-2.52	
	S-An	.0328	.01516	2.16	17.9%
21) Var-s	Size-s	.463	.1280	3.62	
	Move-$\bar{x}$	.171	.0754	2.26	12.6%
21) Var-s	Size-s	.475	.1263	3.76	
	PRF-Ha	-1.12	.4384	-2.55	
	Moves-$\bar{x}$	.169	.0743	2.28	15.0%
21) Var-s	Size-s	.466	.1235	3.78	
	Moves-$\bar{x}$	.132	.07285	1.81	
	P-Or	-.727	.2875	-2.53	
	S-In	-1.26	.3979	-3.17	
	S-Un	1.19	.4616	2.57	
	S-Ha	-.883	.4353	-2.03	19.8%

TABLE IX (continued)

REGRESSION COEFFICIENTS FOR SELECTED 2 AND 3 MEASURE PREDICTION EQUATIONS

	CV	PV	COEFF	SD/ COEFF	t-RATIO	R^2
22)	Var-$\bar{x}$	Size-s	.612	.1927	3.18	
		Moves-$\bar{x}$	.302	.1133	2.67	12.2%
22)	Var-$\bar{x}$	Size-s	.647	.1873	3.46	
		PRF-Ha	-1.72	.6505	-2.64	
		Moves-$\bar{x}$	.307	.1102	2.78	
		PRF-De	2.24	-.9621	2.33	17.0%
22)	Var-$\bar{x}$	Size-s	.69	.1865	3.70	
		PRF-Ha	-1.79	.6448	-2.77	
		Moves-$\bar{x}$	.303	.1091	2.78	
		PRF-De	2.40	.9553	2.51	
		P-Se	-1.54	.7035	-2.19	18.6%
23)	Apart-s	S-Un	1.70	.4456	3.81	
		S-Ac	.804	.3598	-2.24	8.0%
23)	Apart-s	Size-s	.461	.1075	4.29	
		S-Un	1.44	.4317	3.33	
		S-Su	-.785	.3448	-2.28	15.5%
23)	Apart-s	Size-s	.46	.1063	4.33	
		S-Un	1.36	.4284	3.18	
		S-Su	-.917	.3461	-2.65	
		P-De	.839	.3701	2.27	17.3%

Note: All R^2 values are adjusted for degrees of freedom.

TABLE X

PREDICTION EQUATIONS CONSTRUCTED FROM

EXTREME SCORES

CV/Moderator Variable	R^2	
1) C-Time/ S-Af-High	45.8%	(F = 13.41, df = 41, p < .01)
$\hat{Y}$ = 124 - 3.73(S-Au) - 3.73(S-Or) + 3.76(S-Ha)		
s = 26.56		
1) C-Time/ S-Pl-High	36.4%	(F = 9.76, df = 43, p < .01)
$\hat{Y}$ = 120 - 3.01(S-Au) - 3.25(S-Or) + 2.99 (S-Ha)		
s = 31.11		
2) H-V/S-Un-High	35.1%	(F = 12.64, df = 41, p < .01)
$\hat{Y}$ = 1.84 + .0549(P-Ac) - .0586(S-Ac)		
s = .3795		
2) H-V/S-Af High	26.3%	(F = 6.24, df = 41, p < .01)
$\hat{Y}$ = .839 + .0351(S-Ha) - .0384(S-Ag) + .0334(S-Im)		
s = .4252		
3) Words-1/ S-Sr High	42.7%	(F = 8.27, df = 35, p < .01)
$\hat{Y}$ = -184 + 1.73(P-Ac) - 1.95(S-Ex) + 7.13(S-Sr) - 2.16(PRF-Ag)		
s = 12.29		
3) Words-1/ S-Af High	39.6%	(F = 10.62, df = 41, p < .01)
$\hat{Y}$ = -35.5 + 2.57(S-Ac) - 1.32(S-Ex) + 1.11(P-Ac)		
s = 13.26		

TABLE X (continued)

PREDICTION EQUATIONS CONSTRUCTED FROM

EXTREME SCORES

CV/Moderator Variable	R^2	
4) Int-1/Low P-Un	32.3%	(F = 12.69, df = 47, p < .01)
$\hat{Y}$ = 1.76 + .225(Dy) - .152(PRF-Un)		
s = .8547		
4) Int-1/Low Moves-s	32.0%	(F = 12.03, df = 45, p < .01)
$\hat{Y}$ = 5.47 - .170(PRF-Ab) - .0379(Size-s)		
s = .9687		
5) Act-1/Sm-Ch-Low	40.6%	(F = 9.39, df = 45, p < .01)
$\hat{Y}$ = 5.01 - .175(PRF-Pl) + .118(P-Un) - .108(P-Au) - .066(S-Ch)		
s = 1.34		
5) Act-1/Sm-Ch-High	37.4%	(F = 7.88, df = 42, p < .01)
$\hat{Y}$ = 1.58 + .0913(P-Au) - .0897(P-Un) + .136(Dy) + .0070(World)		
s = .9884		
6) Conf-1/High PRF-Ab	26.3%	(F = 5.76, df = 37, p < .01)
$\hat{Y}$ = 1.03 - .207(PRF-Se) + .159(PRF-Un) + .193 (PRF-Ab)		
s = 1.132		

TABLE X (continued)

PREDICTION EQUATIONS CONSTRUCTED FROM

EXTREME SCORES

CV/Moderator Variable	R^2	
6) Conf-1/Low S-Ch	25.0%	(F = 8.49, df = 43, p < .01)

$\hat{Y}$ = 6.38 - .173(PRF-Se) - .110(P-Ch)

s = 1.276

7) Comp-1/High S-Ch 40.4% (F = 8.50, df = 42, p < .01)

$\hat{Y}$ = 6.96 + .122(PRF-Ac) - .147(S-Ch) - .228 (PRF-Se) + .135(PRF-Un)

s = .9976

7) Comp-1/High PRF-Ab 39.3% (F = 7.47, df = 36, p < .01)

$\hat{Y}$ = .875 + .0285(Moves-s) + .227(PRF-Ab) - .104 (P-Un) + .0913(P-Au)

s = 1.063

8) Clar-1/Low P-Cs 25.4% (F = 6.33, df = 44, p < .01)

$\hat{Y}$ = .594 + .153(S-Ch) + .171(prf-Ac) - .0639(P-Au)

s = .9589

8) Clar-1/High PRF-Sr 25.4% (F = 6.22, df = 43, p < .01)

$\hat{Y}$ = 1.92 + .122(Ac) + .108(Su) - .0885(Ha)

s = .9357

9) Cont-1/Low En-PRF 36.8% (F = 9.95, df = 43, p < .01)

$\hat{Y}$ = 3.33 - .147(Ac) + .0830(Su) + .0767(Ag)

s = .8586

TABLE X (continued)

PREDICTION EQUATIONS CONSTRUCTED FROM

EXTREME SCORES

CV/Moderator Variable	R^2	
9) Cont-1/Low S-Ch	32.1%	(F = 11.64, df = 44, p < .01)

$\hat{Y}$ = .625 + .219(Dy) - .0268(Size-s)

s = 1.019

10) Adds-1/High PRF-Ha	37.0%	(F = 14.51, df = 44, p < .01)

$\hat{Y}$ = -4.45 + .0673(Size-$\bar{x}$) + .261(Ag-PRF)

s = 2.817

10) Adds-1/Low Size-s	30.7%	(F = 8.10, df = 45, p < .01)

$\hat{Y}$ = -1.02 - .134(En) + .165(Au) + .117(Af)

s = .9365

11) Words-2/Low PRF-Ha	40.6%	(F = 9.36, df = 45, p < .01)

$\hat{Y}$ = -25.6 + 2.82(En) + .359(Moves-$\bar{x}$) + 1.98(Af)

- 1.62(Ag)

s = 19.73

12) Int-2/Low Moves-$\bar{x}$	30.3%	(F = 6.94, df = 38, p < .01)

$\hat{Y}$ = -.158 + .192(Un) + .447(Moves-$\bar{x}$) - .0918(Ac)

s = .08745

12) Int-2/High PRF-En	27.6%	(F = 7.75, df = 50, p < .01)

$\hat{Y}$ = 7.23 - .307(Dy) - .0076(World) + .122(Se)

s = 1.041

TABLE X (continued)

PREDICTION EQUATIONS CONSTRUCTED FROM

EXTREME SCORES

CV/Moderator Variable	R^2	
13) Act/High PRF-Sr	32.1%	(F = 6.43, df = 42, p< .01)

$\hat{Y}$ = 2.85 + .577(In) - .114(P1) + .128(Dy) - .0111 (Move-$\bar{x}$)

s = .9813

13) Act/Low Size-s 25.2% (F = 9.07, df = 46, p < .01)

$\hat{Y}$ = 3.30 - .674(Size-s) + .0971(Se)

s = 1.059

14) Conf-1/High Size-$\bar{x}$ 21.5% (F = 7.30, df = 44, p < .01)

$\hat{Y}$ = .221 + .235(Af) - .131(Dy)

s = 1.123

15) Comp-2/High PRF-Sr 24.5% (F = 8.45, df = 44, p < .01)

$\hat{Y}$ = -.533 + .154(Dy) + .0843(Ex)

s = 1.019

16) Clar-2/Low Size-s 32.2% (F = 8.43, df = 44, p < .01)

$\hat{Y}$ = 1.97 + 1.66(PRF-Ac) - .118(PRF-Su) + .139(Dy)

s = .8086

16) Clar-2/High Size-$\bar{x}$ 26.5% (F = 9.31, df = 44, p < .01)

$\hat{Y}$ = 3.32 + .127(PRF-Ac) - .0802(PRF-Sr)

s = .8685

TABLE X (continued)

PREDICTION EQUATIONS CONSTRUCTED FROM

EXTREME SCORES

CV/Moderator Variable	R^2	
17) Cont-2/Low Dy	38.4%	(F = 8.49, df = 44, p < .01)
$\hat{Y}$ = .893 + .116(P-Cs) + .105(PRF-Un) - .0054(World) - .0551(P-Au)		
s = .8476		
17) Cont-2/High P-Au	26.4%	(F = 6.51, df = 43, p < .01)
$\hat{Y}$ = 1.07 - .0229(Size-s) + .117(PRF-Ab) + .133(Dy)		
s = .9916		
18) Adds-2/Low P-Un	27.0%	(F = 10.07, df = 47, p < .01)
$\hat{Y}$ = -.160 + .0884(Moves-$\bar{x}$) - .117(Moves-s)		
s = 1.684		
18) Adds-2/High P-Au	25.1%	(F = 8.70, df = 44, p < .01)
$\hat{Y}$ = 3.33 + .0347(Size-$\bar{x}$) - .351(PRF-Ac)		
s = 2.534		
19) Cross/Low PRF-Af	43.9%	(F = 11.68, df = 38, p < .01)
$\hat{Y}$ = -2.05 + .236(Ch) + .146(Cs) - .160(Af)		
s = .7753		
19) Cross/ Low PRF-Ab	33.9%	(F = 8.34, df = 40, p < .01)
$\hat{Y}$ = -2.94 + .179(Cs) + .188(Ch) - .103(Ag)		
s = .9508		
21) Var-s/Low PRF-Af	43.5%	(F = 7.32, df = 36, p < .01)
$\hat{Y}$ = 104 + .468(Size-s) - 5.05(Ch) - 2.85(Ha) - 3.95(Ag) + 2.42(Ex)		

TABLE X (continued)

PREDICTION EQUATIONS CONSTRUCTED FROM

EXTREME SCORES

CV/Moderator Variable	R^2	
	s = 23.32	
21) Var-s/Low PRF-Cs	40.9%	(F = 10.94, df = 40, p < .01)
	$\hat{Y}$ = 58.4 + 1.09(Size-s) - 5.64(Cs) - .234(Size-$\bar{x}$)	
	s = 22.98	
22) Var-$\bar{x}$/Low PRF-Cs	50.1%	(F = 22.57, df = 41, p < .01)
	$\hat{Y}$ = 77.5 + 1.98(Size-s) .416(Size-$\bar{x}$)	
	s = 29.33	
22) Var-$\bar{x}$/Low PRF-Af	46.0%	(F = 9.74, df = 37, p < .01)
	$\hat{Y}$ = 11 + 1.19(Moves-$\bar{x}$) - 3.41(Ch) + .910(Size-s) - 2.10(Moves-s)	
	s = 33.23	
23) Apart-s/High PRF-Ac	46.0%	(F = 11.45, df = 45, p < .01)
	$\hat{Y}$ = -4.14 + 3.63(PRF-Ch) + .377(Size-x) - 13.3(In) - 3.21(PRF-Cs)	
	s = 21.45	
23) Apart-s/High PRF-Au	41.4%	(F = 10.56, df = 50, p < .01)
	$\hat{Y}$ = -12.9 + .388(Move-$\bar{x}$) + 1.35(En) - .635(Moves-s) + .288(Size-s)	
	s = 13.55	

TABLE X (continued)

PREDICTION EQUATIONS CONSTRUCTED FROM

EXTREME SCORES

CV/Moderator Variable	R^2	
24) Apart-$\bar{x}$/High PRF-Ab	50.1%	(F = 14.38, df = 37, p < .01)

$$\hat{Y} = -5.42 + 1.02(\text{Size-s}) - 12.6(\text{In}) + 1.66(\text{P-Ch})$$

$$s = 22.36$$

24) Apart-$\bar{x}$/High PRF-Ac	34.1%	(F = 7.34, df = 45, p < .01)

$$\hat{Y} = -69.7 + 4.09(\text{PRF-Ch}) - 14.3(\text{In}) + .250(\text{Size-}\bar{x}) + 2.75(\text{PRF-Af})$$

$$s = 23.37$$

25) Moves-s/Low PRF-Cs	31.3%	(F = 10.81, df = 41, p < .01)

$$\hat{Y} = 43.3 + 1.0(\text{Size-s}) - 5.08(\text{Cs})$$

$$s = 26.3$$

25) Moves-s/High PRF-Cs	29.7%	(F = 8.31, df = 49, p < .01)

$$\hat{Y} = -22.4 + 1.08(\text{Size-s}) + 2.09(\text{Ex}) + 2.93(\text{Au})$$

$$s = 29.86$$

26) Moves-$\bar{x}$/Low PRF-Af	54.2%	(F = 13.14, df = 37, p < .01)

$$\hat{Y} = 133 + 2.51(\text{Moves-}\bar{x}) - 7.96(\text{Ch}) - 4.33(\text{Moves-s}) + 1.21(\text{Size-s})$$

$$s = 54.20$$

TABLE X (continued)

PREDICTION EQUATIONS CONSTRUCTED FROM

EXTREME SCORES

CV/Moderator Variable	R^2	
26) Moves-$\bar{x}$/High PRF-Cs	47.9%	(F = 12.96, df = 48, p < .01)

$$\hat{Y} = 202 + 2.01(\text{Size-s}) - 12.5(\text{Af}) + 7.65(\text{Ex}) - 6.29(\text{Ag})$$

s = 53.00

Note: All R^2 values are adjusted for degrees of freedom.

rely exclusively on the R^2 value as this is a study that focuses on prediction rather than explanation. Using such a criterion, the hypothesis is clearly supported by the data, as extreme scores produced prediction equations that accounted for, at times, 40 to 50% of the subject variability on criterion measures. However, as the sample size decreases, the possibility of obtaining spuriously high correlations between variables becomes more likely (Walsh, note 3). Therefore, Fisher's Z transformation for independent samples was utilized to compare some of the correlation coefficients between the whole sample and various 'moderated' samples (samples that included only extreme scorers on various predictor measures). The use of this procedure was merely one attempt to assess whether or not the use of extreme scores and reduced sample sizes was highly fallacious (i.e., producing higher correlations and regression equations that account for greater amounts of variance due to reduced sample sizes), or whether the extreme scorers could actually be considered significantly different than the sample as a whole and possibly more useful for purposes of prediction. The results of the Fisher Z transformations are described in Table XI. They indicate that in some cases the increased correlations produced by analyzing extreme scores separately are not significantly greater than the correlations produced by the whole sample analyses. However, in several cases (see Table

XI) the use of extreme scores significantly increased correlation coefficients between certain predictor and criterion variables.

Insert Table XI about here.

TABLE XI

FISHER'S Z-TRANSFORMATIONS

FIRST VARIABLE ENTERED--EXTREME SCORES

VS. WHOLE SAMPLE

CV/MOD VAR/1ST VAR ENTERED	r_1	r_2	z-score	p-value
1) C-Time/S-Af-Hi/S-Au	-.405	-.068	2.13	.034
2) H-V/S-Un-Hi/P-Ac	.356	.000	2.18	.030
3) Words-1/S-Sr-Hi/P-Ac	.412	.209	1.27	.206
4) Int-1/P-Un-Lo/PRF-Dy	.368	.053	2.04	.042
5) Act-1/P-Ch-Lo/PRF-Pl	-.450	-.103	2.35	.018
6) Conf-1/PRF-Ab-Hi/PRF-Se	-.100	-.365	1.59	.112
7) Comp-1/S-Ch-Hi/PRF-Ac	.414	.271	0.98	.330
8) Clar-1/PRF-Sr-Hi/PRF-Ac	.365	.203	1.06	.290
9) Cont-1/PRF-En-Lo/PRF-Ac	-.518	-.036	3.21	.0018
10) Adds-1/PRF-Ha-Hi/Size-x	.584	.163	3.02	.0028
11) Words-1/PRF-Ha-Lo/PRF-En	.449	.070	2.54	.011
12) Int-2/Moves-x-Lo/PRF-Un	.332	.072	1.55	.122
13) Act-2/PRF-Sr-Hi/PRF-In	.373	.069	1.91	.056
14) Conf-2/Size-x-Hi/PRF-Af	.419	-.028	2.50	.012
15) Comp-2/PRF-Sr-Hi/PRF-Dy	.413	.174	1.58	.114
16) Clar-2/Size-s-Lo/PRF-Ac	.366	.250	.773	.440
17) Cont-2/PRF-Dy-Lo/P-Cs	.501	.194	2.16	.032
18) Adds-2/P-Un-Lo/Moves-x	.360	.117	1.60	.110
19) # Cross/PRF-Af-Lo/PRF-Ch	.369	.141	1.39	.164
20) # Touch/n.a.	N.S.	N.S.	N.S.	N.S.

TABLE XI (continued)

FISHER'S Z-TRANSFORMATIONS

FIRST VARIABLE ENTERED--EXTREME SCORES

VS. WHOLE SAMPLE

CV/MOD VAR/1ST VAR ENTERED	r_1	r_2	z-score	p-value
21) Var-s/PRF-Af-Lo/Size-s	.441	.334	.718	.479
22) Var-x/PRF-Cs-Lo/Size-s	.644	.315	2.52	.011
23) Apart-s/PRF-Ac-Hi/PRF-Ch	.433	.145	1.95	.052
24) Apart-x/PRF-Ab-Hi/Size-s	.551	.259	2.00	.046
25) Moves-s/PRF-Cs-Lo/Size-s	.498	.281	1.49	.137
26) Moves-x/PRF-Af-Lo/Moves-x	.485	.346	.962	.334
27) Final Qs/n.a.	N.S.	N.S.	N.S.	N.S.

Note: r_1 = extreme score correlation;
r_2 = whole sample correlation.

CHAPTER V

DISCUSSION

The purpose of this study was to investigate several issues with respect to predicting human behavior. The study attempted to demonstrate how some advances/recommendations in the field of personality assessment (Funder, 1984; Levy, 1983; Monson et al., 1982), in combination with some new approaches of Means and this writer (Means and Harper, 1970; Sommers and Means, 1984), could produce predictions greater than is typically found in the literature ($\underline{r}$ = .30 to $\underline{r}$ = .40; $\underline{R}^2$ = 10 to 16%). Results of this study are not easily interpretable. Thus, a brief discussion of the predictor and criterion variables precedes the discussion of the general hypotheses. It is hoped that this will help facilitate a clearer understanding of the results.

With the exception of the PRF, the measures used in this study have little, if any, documented psychometric properties. The MPAI has undergone some initial studies regarding its reliability and validity (Retzlaff et al., note 2). However, neither the peer-report form of the MPAI, or the non-verbal measure have been utilized in previous research. Therefore, this study should be considered

exploratory and its results warrant tentative consideration and cautious interpretation.

The criterion measures used in this study were of a similar nature. In fact, a number of them seem quite distant from behaviors usually considered relevant in personality research. While this can be viewed as a source of criticism, it also illustrates how the study is an analysis of the principles of prediction, rather than research into the practical application of prediction to relevant clinical problems. Therefore, discussion of the results will emphasize how well the predictor variables predict criterion behavior rather than the meaning of the various measures (a point that could easily lead to considerable debate).

A brief discussion of the meaning of the circle test is included. Also, statements are derived from the results that extend into the practical application of clinical assessment. Keep in mind that such statements are intended as suggestions for further research and not as suggestions to be implemented in clinical practice. Finally, such suggestions are justified by the fact that this was an investigation into the principles of prediction (Pedhazur, 1982).

The Circle Test

Use of the non-verbal circle test accounted for proportions of variance that were, at times, greater than variance accounted for by more traditional measures. This may be due, in part, to the non-verbal nature of some of the criterion tasks (two-stick task). That such should be the case is not surprising. It has been previously noted that self-report measures are most closely related to, or the best predictors of, other self-report measures (Cheek, 1982; Mischel, 1968). Also, other studies have shown that averaged descriptions of behavior are the best indicators of subsequent averaged behavior and that attitude behavior relationships are moderated by the attitude's relationship to the behavior predicted (Epstein, 1980; Sherman and Fazio, 1984; Weigel and Newman, 1976).

Results showed that the average size of circle and world circle drawn by subjects were both significantly correlated with the nurturance scale of the PRF. These correlations were small but significant at the $p < .01$ level. That people who draw larger circles would score as more nurturant on a personality test seems to make intuitive sense. Constructs such as openness or expansiveness may be associated with larger circle drawers and also may be associated with high nurturance scores on the PRF. However, whether or not either of these measures actually has a significant relationship with nurturant behavior was not

addressed in this study. However, it is of interest to note that females scored significantly higher than males on the nurturance scale of the PRF and also drew significantly larger circles for the world than males. Such a finding lends some support to the potential utility of both measures as behavioral predictors.

Finally, it should be noted that the variability observed among individual circle sizes can be considered as evidence for the instability of the measure. In the present study, such variability was utilized as an additional measure and was often useful in predicting behavior. However, modifications in the instructional set, administration, and scoring of the circle test may be necessary to refine its application as a measure of personality. Further research and possible revision is needed to determine whether or not this measure can be useful as a measure of personality and a predictor of behavior.

Discussion of the Hypotheses

The hypotheses of this study were generally concerned with how various approaches to assessment could be combined to enhance behavioral predictions. Approaches of interest included self-report, peer-report, non-verbal, and the use of extreme scores.

The first hypothesis suggested that non-verbal measures would be the most efficient predictors of behavior, followed by peer-report measures, and that self-report measures would be the worst predictors. Results were mixed in this regard. Non-verbal measures did appear to be the best predictors, but only for specific criterion behaviors that were conceptually similar, i.e., two-stick task. On other behavioral measures, the PRF or SMPAI appeared to be at least as useful for prediction. Also, for the verbal self-ratings of image quality self-report measures seemed to provide the best predictions. While this latter finding is contrary to the first hypothesis, it is generally supported by previous research (Cheek, 1982; Mischel, 1968). Finally, peer-report measures were generally poorer predictors of both behavior and verbal self-ratings of image quality as compared with self-report/self-report and non-verbal/non-verbal predictions. Three explanations for the poor performance of peer-report measures seem plausible: 1) lack of experimental control over how well the peer or relative who filled out the report really 'knew' the subject; 2) lack of validity/reliability of the peer-report measure; 3) inherent weaknesses involved in the peer-report process (e.g., fundamental attribution error or projective bias in person perception., Cheek, 1982; Ross, 1977).

The second hypothesis was generally concerned with which two measure combinations would yield the best behavioral predictions and with the comparison of two measure predictions and single measure predictions. Results suggested that self-report and non-verbal measures generally combined to produce the best predictions. In addition, two measure predictions, particularly when they involved self-report and non-verbal measures, were found to be clearly superior to single measure predictions.

There is some evidence in the literature to help explain these results. Intelligence tests often utilize a format that measures both verbal abilities and perceptual-motor or non-verbal skills (Wechsler, 1981). Notably, such tests are among the best predictors of behavior in the field of psychology. Thus, it makes sense that in the present study a combination of verbal self-report and non-verbal behavioral measures of personality were the best predictors. In addition, as noted before, the criterion variables were probably conceptually most similar to the self-report and non-verbal measures rather than the peer-report measures. Finally, theory and research in communication and psychotherapy often emphasizes the importance of observing non-verbal behaviors in conjunction with verbal behavior (Bandler and Grinder, 1979; Boy and Pine, 1982). Therefore, findings that verbal

self-report and non-verbal behavioral measures, in combination, provide the most accurate predictions appears consistent with theory and research in psychology and communication.

The third hypothesis suggested that three measure combinations would produce better prediction rates than two measures combined or single measures alone. Results concerning this hypothesis were difficult to interpret. In some cases the three measure combinations appeared to be advantageous in that they improved upon two measure predictions. However, in many cases three measure combinations did not provide enhanced predictions. Thus, the tentative conclusions are that the use of two measures in combination is more efficient than three measures because: a) they are more cost-effective, i.e., they provide almost as accurate predictions for less cost in terms of money; b) they are more time efficient for both experimenter and subject (or psychologist and client); c) they produce simpler and more easily interpretable results. These conclusions are tentative as the use of different measures may vary the pattern of results and computer programs may be formulated to interpret complex results.

The fourth hypothesis suggested that predictions would be improved if subjects with extreme scores on some of the measures were included in separate regression analyses. In other words, subjects with strong and distinct traits on specific measures were hypothesized as more predictable than the entire subject sample as a whole. Although it proved difficult to compare the smaller sample of extreme scorers with the whole sample and test this comparison for statistical significance, results seem to suggest that extreme scorers may be more predictable than all subjects. Further research and the use of a cross-validation sample is necessary to confirm this tentative conclusion (Walsh, note 4; Wiggins, 1973). At any rate, it is suggested that the ability of extreme scores to improve prediction rates from $\underline{R}^2 < 15\%$ to $\underline{R}^2 > 40\%$ in some cases is promising. After all, if predictions that account for up to 40 to 50% of the variation in behavior were sustained using the exploratory measurement techniques of this study perhaps more psychometrically sophisticated instruments would produce even better predictions.

The results that extreme scorers were slightly more predictable than the population as a whole is generally supported by the literature. In social psychology, attitude-behavior correlations have been found to fluctuate as a function of the subject's attitude strength. The

stronger the attitude, the better it predicts attitude-relevant behavior (Sherman and Fazio, 1983). In addition, Bem and Allen (1974) demonstrated that some of the people were predictable some of the time on the basis of extreme scores. Finally, the extreme scorer hypothesis is particularly relevant with respect to psychopathological populations. Several theories and studies support the notion that clinical populations may be more predictable from their personality traits than normals (Alker, 1972; Levy, 1983; Mariotto and Paul, 1975; Mariotto, 1978). Therefore, it is suggested that future research explore this question more thoroughly by comparing clinical and normal populations directly.

Leaks in the Prediction Barrier

A general purpose of the present study was to address the issue of whether innovative measurement techniques combined with more traditional approaches could provide predictions that were more accurate than $r = .40$ or $R^2 = 16\%$. Again, results were mixed with regard to this issue. When individual scales of personality measures were correlated with criterion behaviors, significant correlations ($p < .01$) ranged from $r = .185$ to $r = .346$. This is clearly within the limits generally found in personality research (Mischel, 1968; Funder and Ozer, 1983). However, when scales and

measures were combined as predictors and multiple regression analyses performed, prediction rates appeared to move beyond the traditional barrier., e.g., $\underline{R}^2$ = 21.7%. Now, the question of whether the values obtained in this study are statistically different than the traditional values is a complex one. Due to large amounts of variability present in the prediction equations, an $\underline{R}^2$ = 21.7% may not be statistically different than $\underline{R}^2$ = 16.0%. Perhaps this question can be addressed in future research using more precise measurement techniques and cross validation procedures, but for now, Pedhazur's (1982) suggestion that the value of $\underline{R}^2$ may be adequate for judging the accuracy of prediction equations is considered a reasonable, albeit insufficient guideline. Therefore, since $\underline{R}^2$ = 21.7% > $\underline{R}^2$ = 16.0%, this study should be considered as having produced prediction rates that are at least marginally beyond the $\underline{r}$ = .40 barrier. Granted, the measurement techniques were untested and perhaps unstable, the behaviors predicted irrelevant, and the findings possibly unreplicable, but the traditional prediction barrier was exceeded. It is left to further research using relevant behaviors, cross validation samples, and measures that have respectable psychometric properties to confirm or disconfirm these findings. In addition, if such research is conducted exclusively with clinical populations, much higher correlations may be possible., e.g., $\underline{r}$ = .70.

Potential Clinical Implications

Further research is necessary before the present findings may be extended to clinical practice, however, some speculation as to potential implications is of interest. At least five implications for clinical practice can be derived from the current study. These include: 1) clinical populations (or persons with strong and distinct personality traits) appear more predictable than normal populations/individuals; therefore, using personality assessment for predicting client/patient behavior appears more resonable and ethical than much of the social psychology literature suggests (Mischel, 1968; Kenrick and Dantchik, 1983); 2) even the best behavioral predictions of clinical populations will probably still leave large amounts of variation unaccounted for; as a consequence, overreliance on personality assessment to predict behavior is still an activity that is questionable from both practical and ethical viewpoints; this appears particularly true in cases where psychologists attempt to predict the behavior of so-called 'normal' individuals who exhibit behavioral variability and adaptive functioning (Alker, 1972; Fiske and Maddi, 1961; Levy, 1983; Mariotto, 1978; Mariotto and Paul, 1975); 3) the use two separate measures of personality in combination may represent the most cost-efficient and effective use of the therapist's and

client's time and money; 4) if two measures are selected for clinical assessment, they should probably be complementary in nature; that is, they should assess different components of behavior, much as the measures in the present study; behavioral assessment techniques (Golfried and Davison, 1975), although not utilized in this study, may be complementary to self-report measures and therefore a preferred assessment strategy; however, further research is necessary to determine if such is actually the case; 5) due to the potential complexity of some of the predictions, computer technology may become an essential adjunct to clinicians attempting to make behavioral predictions.

Criticisms of the Study

The purpose of this section is threefold. First, to provide a list of some major shortcomings of this study. Second, to emphasize that generalizations must be qualified due to their speculative nature. Third, to aid future researchers in their efforts to address the issues delineated below. Major criticisms include: 1) this study was correlational and therefore cannot be utilized as evidence for cause and effect; furthermore, the emphasis was on the predictive relationship between variables and minimal effort was made to explain the possible mechanisms

underlying those relationships; 2) the reliability and validity of the self- and peer-report forms of the MPAI, circle test, image quality measures, and two stick task range from questionable to non-existent; that extreme scorers were more predictable lends some support to the stability of within person variance using these measures; however, this study was essentially nomothetic and idiographic procedures are necessary to address the issue of stable intraindividual variability; therefore, the use of measures that are psychometrically questionable serves to threaten this study's generalizability and replicability; 3) the highest behavioral predictions were noted between the non-verbal measure and two stick task; both of these behaviors were conceptually similar non-verbal tasks, and therefore the fact that they correlate with one another is not necessarily evidence that they would correlate with any other type of behavior; 4) the tasks that were utilized as criterion variables do not appear clinically relevant; therefore, the study probably has little, if any, clinical utility; 5) a cross-validation sample was not used in this study; as a consequence, the stability of the present findings is unknown; any replication or variation of the present study should include a cross-validation sample (Walsh, note 4; Wiggins, 1973); 6) the results appear unstable with respect to the image quality measures; differences were noted between the correlations of the first

and second administration of this scale and the predictor variables; 7) in the prediction equations, the amount of variance ($s_{y \cdot x}$) was often very high; this suggests that while predictions accounted for a significant amount of variance, they were also quite imprecise; 8) the effects of outliers and residuals were not considered in this study; 9) the prediction equations obtained were often complex and difficult to interpret; and 10) the study did not assess the relative merits of many traditional measurement techniques, e.g., behavioral assessment, projective techniques.

Recommendations for Future Research

A major task of future research would be to merely address and remediate the various deficiencies in this study. This would entail using additional measures that are more precise and psychometrically acceptable, a cross-validation sample, and examination of outliers/residuals. It would also be advantageous to use a clinical population and predict behaviors that are relevant and useful for clinical practitioners. For example, in a mental health setting the behavioral criteria might include premature termination by the client, premature termination or transfer by the clinician, hospitalization, completion of treatment, therapist rating of various transference

behaviors, etc.

Many issues have yet to be fully addressed in the literature on personality assessment and behavioral prediction. One of the most promising involves the delineation of moderator variables that aid researchers and clinicians in identifying groups of individuals that are more and/or less predictable (Cheek, 1982; Penner and Wymer, 1983). Snyder's (1974; 1979) work on self-monitoring has produced some of the best results in the area.

Of particular interest to this writer is research that explores the utility of the construct of intraindividual variability as a personality trait and/or moderator variable (Fiske and Maddi, 1961; Fiske and Rice, 1955). Several methods of proceeding with such research come to mind. First, the work of and Means and this writer on the development of a non-verbal measure of intraindividual variability may be pursued (Means, note 1; Means and Harper, 1970; Sommers and Means, 1984). Second, different methods for assessing intraindividual variability may be explored. For example, the variability within trait scores on a psychological test may be another indicator of variability within an individual. Third, factor analytic techniques may be utilized to determine what items on traditional personality tests (e.g., PRF, MMPI, etc.)

represent the construct of intraindividual variability as measured by the circle test or two stick task. Fourth, the utilization of aggregated scores, or multi-act criteria may further increase the inter-correlations of variability measures (Epstein, 1980). Finally, movement toward controlled experimentation and single subject designs may also help clarify better ways to measure the behavioral effects of intraindividual variability.

In sum, as its name suggests, the concept of variability has a quality of elusiveness. One may pursue intraindividual variability as well as interindividual variability. Furthermore, the intra- and inter-variability of single trait dimensions has not been evaluated. Examining these different issues probably would allow psychologists to become more precise in their attempts to predict behavior. However, no matter how precise predictions become, the interrelationship between variation and stability will probably always be a subject that holds both challenge and frustration for researchers and practitioners in psychology.

> "... after changes upon changes we are more or less the same, after changes we are more or less the same" (Simon and Garfunkle, 1968).

Summary and Conclusions

Whether or not an individual's behavior can be predicted from personality assessment has been disputed in the literature (Kenrick and Dantchik, 1983; Mischel, 1968). Similarly, behavioral predictions derived from situational analyses also have been poor (Bowers, 1973; Funder and Ozer, 1983). As a consequence, many researchers in personality/social psychology have proposed methodological advances designed to improve behavioral predictions (Epstein, 1980; Funder, 1983; Mischel and Peake, 1982; Monson et al., 1982; Sherman and Fazio 1983; Sommers and Means, 1984).

The purpose of the present study was to implement four approaches for improving behavioral predictions simultaneously in an effort to produce predictions greater than $r = .40$ or $R^2 = 16\%$. The four approaches were: 1) a strategy designed to discriminate between predictable and non-predictable on the basis of extreme scores (Levy, 1983; Sherman and Fazio, 1983); 2) the use of behavioral tasks that were low stimulus pull (Monson et al., 1982); 3) the use of a new non-verbal approach to assessing intraindividual variability as a personality trait (Means and Harper, 1970; Sommers and Means, 1984); and 4) the use of several assessment procedures in combination, i.e.,

self-report, peer-report, non-verbal (Funder, 1983).

Both the nature of this study (i.e., inclusion of non-validated measures; a correlational design; lack of cross-validation procedures) and its results (large amounts of variance in the resultant prediction equations), dictate that conclusions drawn from it be stated tentatively. Five such conclusions were noted. First, non-verbal measures were generally better predictors of conceptually similar non-verbal behaivor than any of the other measures. Second, self-report measures were generally better predictors of subjects' self-ratings of image quality. Third, non-verbal and self-report measures used in combination generally provided predictions that were more efficient than other two and three measure combinations. Fourth, the $\underline{r}$ = .40 ($\underline{R}^2$ = 16%) barrier was at least marginally exceeded, using untested measurement techniques, low stimulus pull situations, and multiple regression analyses. Fifth, analysis of extreme scorers as a sub-sample produced prediction rates that accounted for, at times, up to 40 or 50% of the variance.

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APPENDIX A

Experimenter's Script for the First Session

Regular blurb

I am gonna read this explanation of the experiment, so if you have any questions as I go be sure and ask them.

Some facts about this experiment

This experiment is called 'personality and prediction' and is worth a total of six experimental units. Does everyone here realize that? If anyone does not want or need six units then you are probably in the wrong place.

Major goals for today

There are three major things we need to accomplish today. First, notice that you are receiving a brief adjective checklist. You are not to fill this out. What you need to do is find a friend or relative that will fill this out with you in mind. do your best to find a friend or family member who knows you pretty well, and then ask them to take a few minutes to rate you on these adjectives. When you turn this in at your individual session you will get your experimental units. We will talk about this again

later. Write 'your name' on the top of this checklist (use chalkboard for example). Second, we have a personality test for you to take today. This has 440 true/false items and usually takes from 45 minutes to one hour. Third, when you have finished the personality test, bring it up front and schedule an individual appointment for some time in the next week. Your individual appointment will last about 30 minutes and during that time you will be asked to turn in the form that was filled out by your friend or relative. You will also perform three short tasks during your individual appointment.

Experimental units

For convenience, and to make sure you all show up for your individual appointments, we will give you all six experimental units at that time. Any questions?

APPENDIX B

Experimenter's Script for Individual Sessions

1) Pick up the peer-report form of the MPAI from the subject. If they do not have it go ahead with the tasks, but do not give them their experimental units. In order to receive their units tell them that they must return the form to my office, room 229 in the Psychology/Pharmacy building. I will give them their units at that time.

2) "Ready? As we go through these tasks you might notice that they are a little unusual and it may feel weird to do some of them. Do not let that bother you, just relax and try to enjoy yourself a bit. After all, its probably the only time in your life that you will be asked to do this type of thing."

3) "Here's the first task (have materials ready)." Hand them a piece of paper of pencil and say... "Just draw a circle on this paper. Draw whatever size feels best or most comfortable to you. The artistic quality of your circle is not important, just draw one that feels good."

a) Hand them the second sheet and say... "now draw another one, whatever size feels good right now;

b) again, whatever feels comfortable;

c) same thing, only whatever feels best now;

d) last one;

e) okay. the first five circles were all drawn just for you. They were your circles. This time I would like you to draw one for the rest of the people in the world. Like, what size circle you think most people in the world would feel comfortable with."

4) Checkerboard assessment. "This task is a timed task. Some people have been known to complete it in five or ten seconds. Even though its a drawing task, I want you to know that you are not being tested for artistic ability. So, do not worry about whether or not you meet artistic standards, I am more interested in the orientation of your drawing in space, how you put it on the paper. Are you ready? Okay. What I would like you to do is to draw a checkerboard on a table, begin."

5) The imagery task. "What I would like you to do now is look at this picture (show TAT card 17bm for two seconds). Alright good. You know how sometimes you daydream, or imagine things in your mind. Well, I would like you to take about one minute and do that right now. What I would like

you to do is create an image in your mind that is meaningful to you. Be sure and pay attention to the image you create as I will be asking you to describe it shortly. You may begin" (if the subject asks what the picture had to do with what they are supposed to imagine, just tell them that they can imagine whatever they want, whatever is a meaningful image to them).

"Alright, times up. Did you create an image? Good. Here is a piece of paper. I would like you to write a brief description of the meaningful image you created" (time passes; again, if the subject has any questions just remind him/her of the original instructions). "Done? Okay, one more thing for this image. Here's a checklist with some of the typical things people see in their images. Please check off the ones that fit your image." Now, repeat these instructions with TAT card 2.

6) The two-stick task. "In this last task we are interested in the kinds of arrangements of lines that people find pleasing. See these two sticks (lines). Arrange them on this piece of paper (hand subject paper), in whatever manner you like. Just re-draw the lines in whatever positions feel good to you. Okay. now I would like you to do it again. Place them on the paper in whatever way feels good to you (hand subject another piece of paper). Do the same thing. Whatever feels comfortable. Again. One last time. Place the sticks in positions that feel good."

APPENDIX C

(copies of sample data follow)

PERSONALITY RESEARCH FORM

DIRECTIONS: Place your name, age, sex, date of testing, and the form administered (AA or BB) in the spaces provided above. The answer boxes below are numbered the same as the statements in the booklet. Answer each statement by placing an X in either the true (T) or the false (F) box as shown in the example.

EXAMPLE

T	X		
F	1	2	3

BEGIN HERE

T/F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
T/F	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88
T/F	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132
T/F	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176
T/F	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
T/F	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264
T/F	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308
T/F	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352
T/F	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396
T/F	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440

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Ab	Ac	Af	Ag	Au	Ch	Cs	De	Do	En	Ex	Ha	Im	Nu	Or	Pl	Se	Sr	Su	Un	In	Dy
6	12	17	6	4	9	13	11	6	12	6	14	11	18	11	11	19	14	15	14	0	17

NAME: Becky L 549-3334 SEX: female AGE: 22

Following are a list of adjectives. We would like you to rate each of them as it usually describes you. Rate them on a 1 to 7 scale, with 1 indicating "Not at all" and 7 indicating "Very much". Please write the number directly in front of each adjective.

1 2 3 4 5 6 7

Not at all — Very much

4 self-blaming	6 exploring	6 needs protection	6 courteous	6 alive to impressions
6 accomplishing	5 self-belittling	6 investigative	7 craves affection	6 seeks respectability
3 friendly	6 achieving	4 meek	6 logical	6 confiding
3 quarrelsome	5 warm	6 productive	5 self-accusing	6 inquisitive
5 individualistic	4 easily-angered	5 good-natured	6 striving	5 self-subordinating
2 inconstant	3 ungovernable	3 argumentative	5 hospitable	6 attaining
2 seeks-certainty	4 unpredictable	3 resistant	4 irritable	5 sociable
3 defensive	6 accurate	3 inconsistent	6 rebellious	4 hot-tempered
6 leading	4 touchy	6 clarifying	4 irregular	4 unmanageable
6 has stamina	6 powerful	4 wary	6 perfectionistic	4 fickle
4 entertaining	6 sturdy	6 supervising	6 suspicious	6 explicit
5 careful	2 exhibitionistic	5 energetic	6 controlling	3 self-excusing
5 lusty	6 seeks-safety	5 colorful	6 persistent	5 dominant
6 supporting	4 reckless	2 fearful	5 conspicuous	6 determined
7 tidy	6 helpful	2 impulsive	4 precautionary	5 showy
6 jolly	6 neat	6 sympathetic	4 incautious	4 cautious
6 observant	5 merry	6 orderly	6 caring	4 foolhardy
6 well-behaved	6 responsive	5 gleeful	6 organized	6 assisting
4 appealing for help	5 seeks recognition	6 notices environment	6 laughter-loving	6 scheduled
6 inquiring	6 help seeking	5 makes good impression	6 perceptive	5 joking

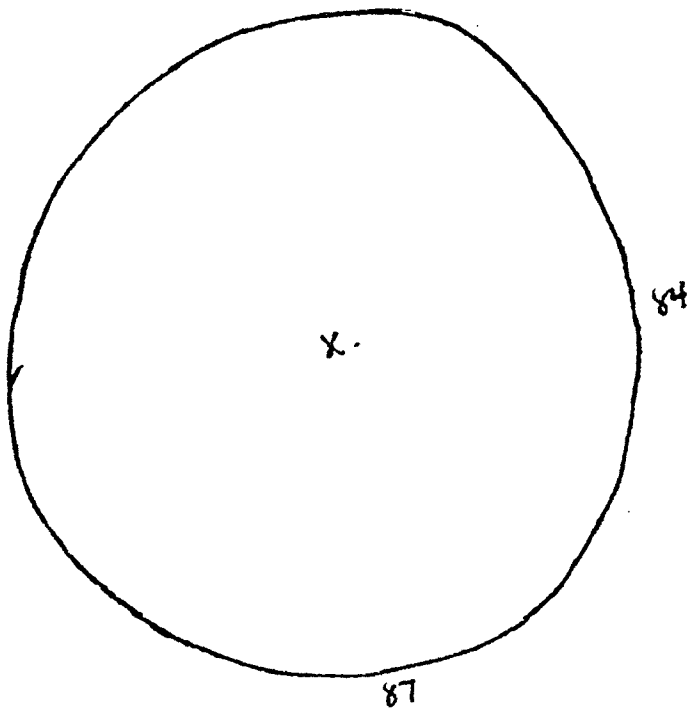
NAME: For Becky SEX: F AGE: 41

Following are a list of adjectives. We would like you to rate each of them as it usually describes you. Rate them on a 1 to 7 scale, with 1 indicating "Not at all" and 7 indicating "Very much". Please write the number directly in front of each adjective.

1 2 3 4 5 6 7

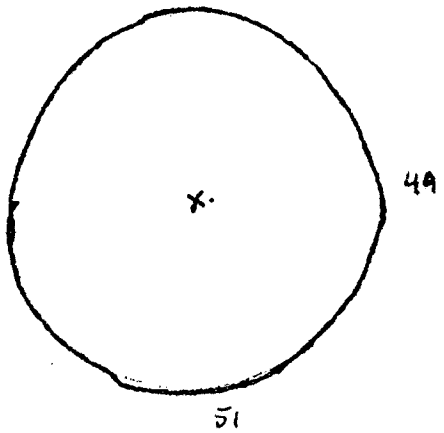
Not at all — Very much

1 self-blaming	3 exploring	3 needs protection	3 courteous	3 alive to impressions
4 accomplishing	1 self-belittling	5 investigative	3 craves affection	3 seeks respectability
3 friendly	6 achieving	2 meek	3 logical	7 confiding
1 quarrelsome	5 warm	3 productive	2 self-accusing	5 inquisitive
4 individualistic	4 easily-angered	3 good-natured	6 striving	4 self-subordinating
2 inconstant	1 ungovernable	5 argumentative	3 hospitable	4 attaining
1 seeks-certainty	2 unpredictable	1 resistant	2 irritable	3 sociable
2 defensive	5 accurate	1 inconsistent	2 rebellious	5 hot-tempered
3 leading	6 touchy	6 clarifying	4 irregular	1 unmanageable
3 has stamina	4 powerful	5 wary	6 perfectionistic	1 fickle
4 entertaining	3 sturdy	5 supervising	6 suspicious	3 explicit
3 careful	1 exhibitionistic	3 energetic	5 controlling	1 self-excusing
2 hasty	5 seeks-safety	3 colorful	5 persistent	3 dominant
3 supporting	1 reckless	4 fearful	5 conspicuous	3 determined
3 tidy	3 helpful	2 impulsive	6 precautionary	3 showy
3 jolly	3 neat	4 sympathetic	2 incautious	4 cautious
4 observant	3 merry	6 orderly	3 caring	1 foolhardy
4 well-behaved	5 responsive	5 gleeful	3 organized	5 assisting
1 appealing for help	5 seeks recognition	3 notices environment	4 laughter-loving	3 scheduled
3 inquiring	5 help seeking	3 makes good impression	3 perceptive	4 joking



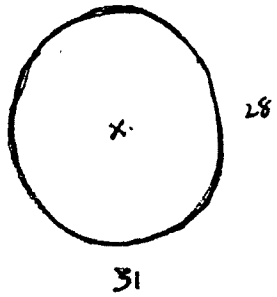
Size = 85.5 mm

Circle #1



Size = 50
Move = 8

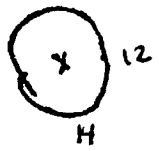
Circle #2



Size = 29.5

Move = 16

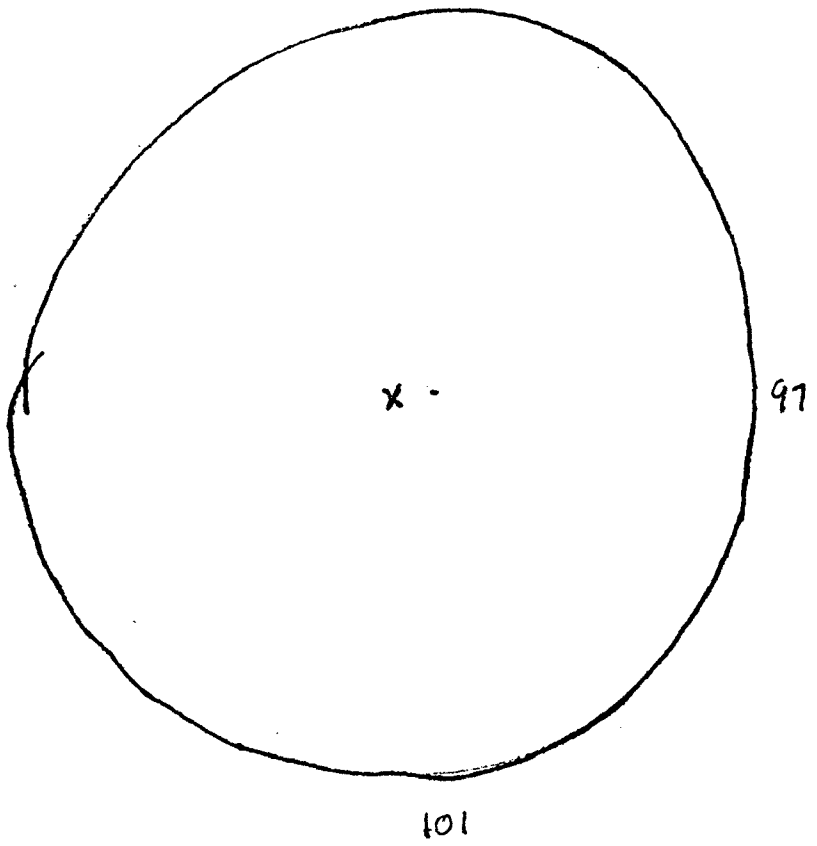
Circle #3



Size = 13

Move = 9

Circle #4



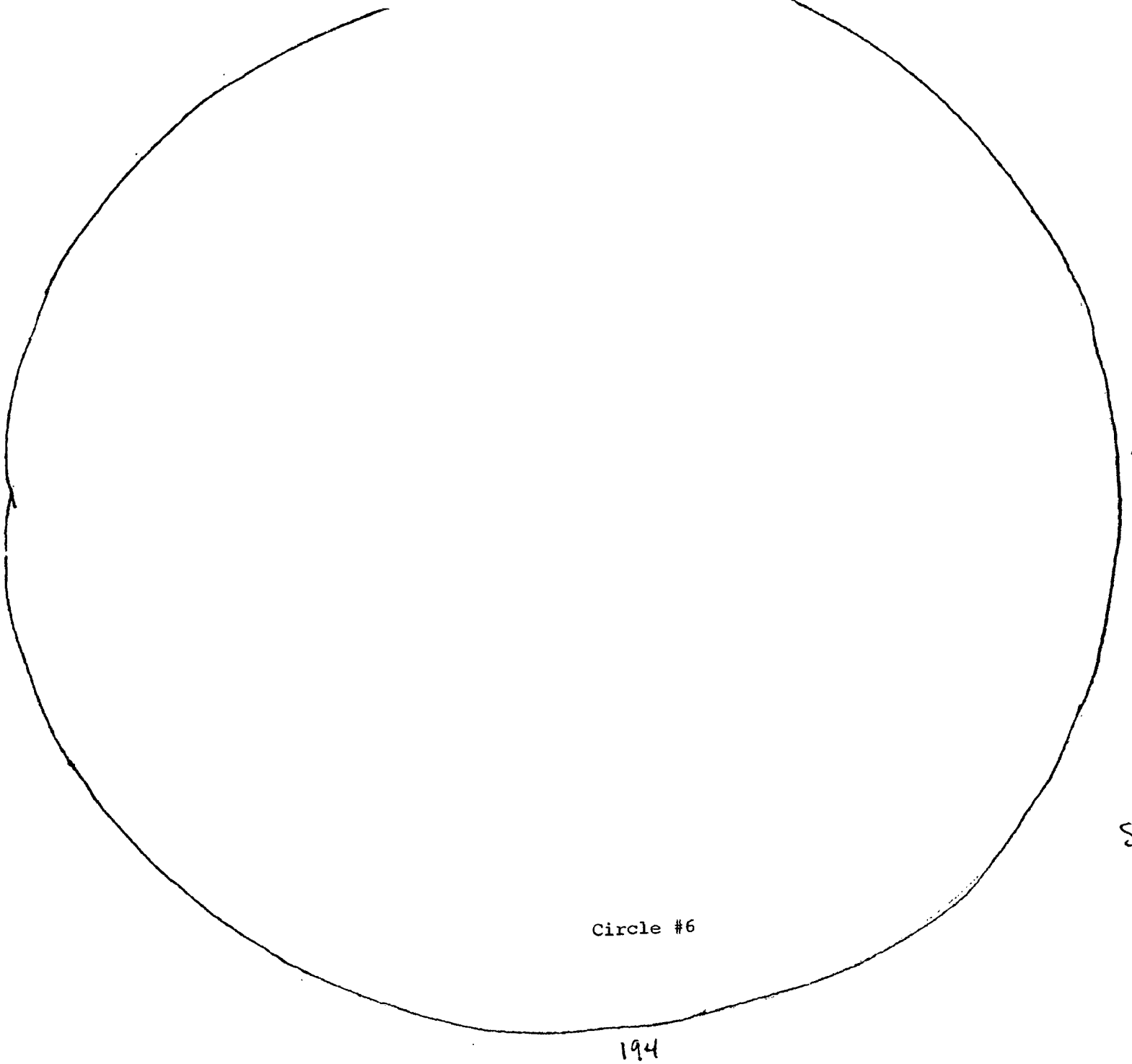
Size = 99

Move = 19

Circle #5

Size-$\bar{x}$ = 55.4 Size-$\underline{s}$ = 36.4

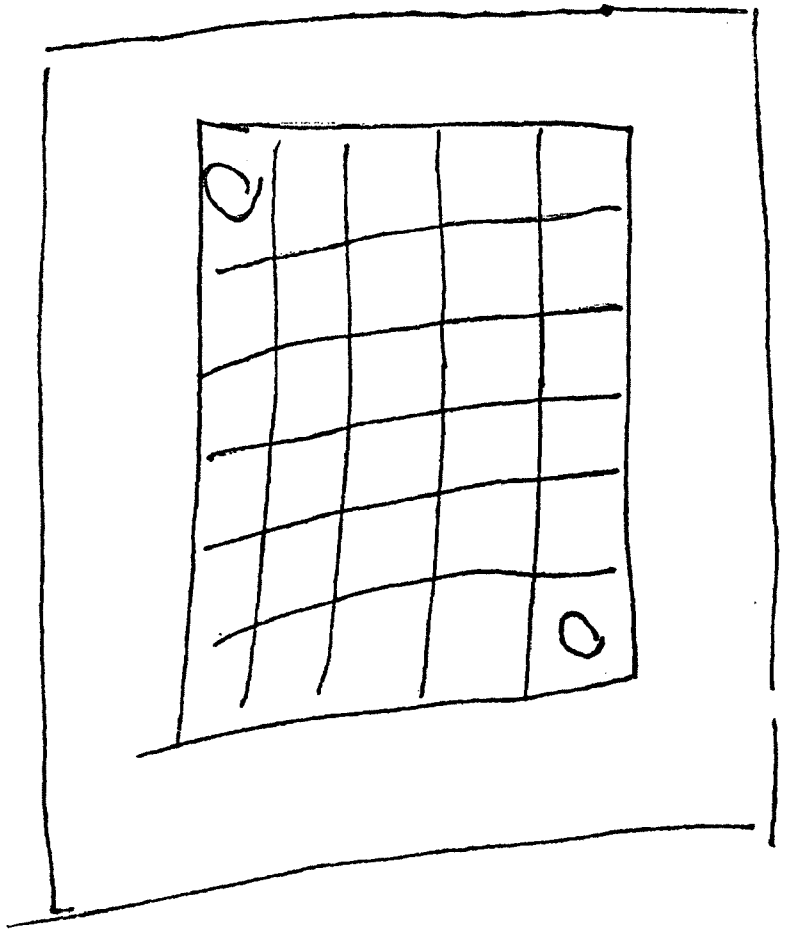
Move $\bar{x}$ = 13.0 Move-$\underline{s}$ = 5.35



Size of World = 198.5

Circle #6

26 Secs Haptic



Checkerboard on a Table

Nova a black standard poodle he has one broken leg so it is wrapped in a blue bandage. He wears a red collar and has very curly fur.

Words-1 = 28

It is a sunny day on a beach of a lake there are waterfalls behind us. There are 10 to 12 people on the beach. someone is trying to watersled.

Words-2 = 30

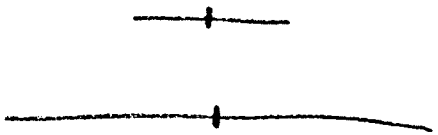
Subject's description of images #1 and #2

IMAGERY CHECKLIST #1

1) Was there movement in your image? No
2) Was there color in your image? Yes Specify Black, Blue, Red
3) Were there people other than yourself? No
4) How many males? NA
5) How many females? NA
6) What ages were the people? _____
7) What were the people doing? _____
8) What were their occupations? _____
9) Were you in the image? No
10) Were there any animals? yes
11) Type and number of animals present. 1 dog
12) Setting... (indoors) or outdoors?
13) Setting... Beach, lake, mountain, farm, (house,) other _____
14) Geographical region, (USA) or other _____
15) Approximate time of day. Evening
16) Approximate time of century. 1983
17) Weather? (if applicable) _____
18) Emotional tone... (happy,) sad, enthusiastic, bored, angry, other _____
19) Overall emotional intensity... 1 2 3 (4) 5
no intensity very intense
20) Overall level of activity... 1 (2) 3 4 5
no activity very active
21) Overall level of conflict... (1) 2 3 4 5
no conflict very conflictual
22) Overall complexity of image... (1) 2 3 4 5
very simple very complex
23) Overall clarity of image... 1 2 3 4 (5)
foggy very clear
24) Overall controllability of image... 1 2 (3) 4 5
no control very controllable
25) Any details of the image that were not mentioned? No

IMAGERY CHECKLIST #2

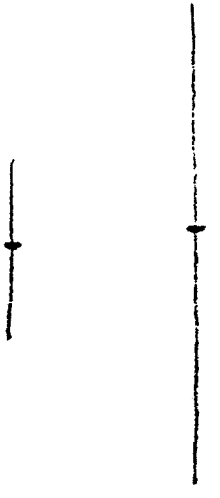
1) Was there movement in your image? yes
2) Was there color in your image? yes Specify Blue Sky
3) Were there people other than yourself? yes
4) How many males? 5
5) How many females? 5
6) What ages were the people? 20-50yrs
7) What were the people doing? Relaxing on The beach
8) What were their occupations? various
9) Were you in the image? yes
10) Were there any animals? yes
11) Type and number of animals present. 1 dog
12) Setting... indoors or (outdoors)
13) Setting... (Beach) lake, mountain, farm, house, other _____
14) Geographical region, (USA) or other _____
15) Approximate time of day. 2:00pm
16) Approximate time of century. 1980
17) Weather? (if applicable) Sunny
18) Emotional tone... (happy) sad, enthusiastic, bored, angry, other _____
19) Overall emotional intensity... 1 2 3 (4) 5
no intensity very intense
20) Overall level of activity... 1 2 3 (4) 5
no activity very active
21) Overall level of conflict... 1 (2) 3 4 5
no conflict very conflictual
22) Overall complexity of image... 1 2 (3) 4 5
very simple very complex
23) Overall clarity of image... 1 2 3 (4) 5
foggy very clear
24) Overall controllability of image... 1 2 3 (4) 5
no control very controllable
25) Any details of the image that were not mentioned? NO



Apart = 13

Var = 28 + 28 = 56

Two-Stick #1



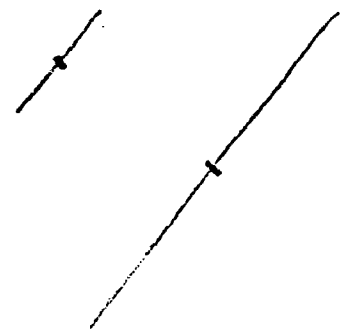
Apart = 24

UAr = 83+85 = 168

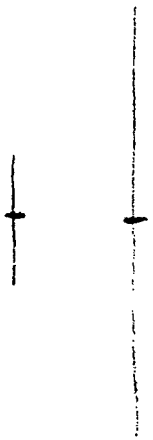
Move = 63+89 = 152

Two-Stick #2

Apart = 25
Var = 110+113 = 123
Move = 53+70 = 123

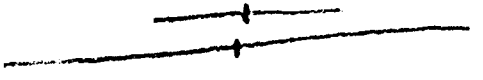


Two-Stick #3



Apart = 16
Var = 97+107 = 204
Move = 201+210 = 411

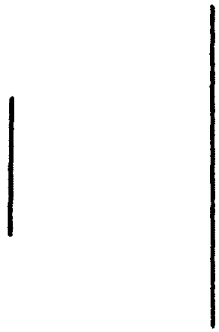
Two-Stick #4



Totals:

Apart - $\underline{S}$ = 8.26
Apart - $\bar{x}$ = 1660
Var - $\underline{S}$ = 67.20
Var - $\bar{x}$ = 120.60
Moves - $\underline{S}$ = 130.00
Moves $\bar{x}$ = 232.00
Touch = 0
Cross = 0

Apart = 5
Var = 34 + 18 = 52
Move = 129 + 113 = 242



Original Two-Sticks

APPENDIX D

Debriefing

Personality and prediction. In psychology there's a big debate over whether or not we can predict human behavior given that we know someone's personality. So we took several measures of your personality and then had you do several unusual tasks. The objective, of course, was to see if we could predict your behavior.

You are probably wondering why you were asked to do such strange tasks. Well, psychologists have found that one of the best ways to get people to act in a manner which is truly characteristic of them is to have them do things that they have never done before. so we picked some things that you have probably never done to give us a better chance at predicting your performance from your personality traits.

A common question about this type of experiment is usually something like, "how did I do?" or "was I normal?" Well, you did fine and we are counting on the fact that you are normal. That is why we picked psychology 110 students to be in this experiment, because we wanted people who were basically normal.

We have not completed the data analysis yet. But what we plan to do is take all the information we have gotten from you (and the other 199 subjects) and dump it into the computer. Then we will come up with a formula for how to predict certain behaviors. Something like, "people who consider themselves very sensitive to their environment and who draw big circles, tend to take longer to draw a checkerboard on a table". Of course, that is not a real important thing to be able to say about people, but if it demonstrateds that people can be predicted, then that will be important enough. Anyway, if you want to find out more about the final results of the study, then you ought to come to the large debriefing session on December 1, at 7:00pm in room LA 103. By the way, please do not tell anyone about this experiment for about three weeks, until we are all finished running subjects. Besides, if you try and talk to anyone about what you did today they will think you are weird for sure.