COGNITIVE DIFFERENTIATION
AND INFORMATION PROCESSING

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1. REP Test Scores, Frequencies and Omega-Square Values of Significant Effects, Correlation Ratios, Correlation Coefficients, and Intrajudge Test-Retest Reliabilities for the High Differentaliated Subjects.......................... 35
REP Test Scores, Frequencies and Omega-Square Values of Significant Effects, Correlation Ratios, Correlation Coefficients, and Intrajudge Test-Retest Reliabilities for the Low Differentaliated Subjects.......................... 36
Abstract

Thirty-eight subjects selected on the basis of extreme REP test scores participated in a task requiring them to make ratings of comfort when presented with hypothetical persons with differing personality attributes. Attribute sets were composed of five bipolar construct dimensions determined individually for each subject by extracting constructs that were mutually unrelated (differentiated) or mutually related (undifferentiated). Subjects rated each of 32 different attribute combinations. It was expected that the mutually related construct dimensions of the undifferentiated group would increase the likelihood of cue inconsistency and result in ratings formed on the basis of a nonadditive model of information processing while the lack of mutual relationship among the constructs of the differentiated group would result in impressions that adhere to an additive model. Results indicated that an additive model adequately accounted for the ratings of all subjects. However, the ratings of the undifferentiated group showed significantly greater nonadditive components than did the ratings of the differentiated group. This result was interpreted to reflect attempts to resolve cue inconsistencies encountered by the undifferentiated group.
Personal Construct Theory (Kelly, 1955) proposes that an individual evolves a system of personal constructs which serves to predict and interpret the events of his life. Man attempts to construe the world around him by actively testing the predictive accuracy of his construct system while continually revising the system in accord with the feedback which is received.

Attempts to systematically measure personal construct systems resulted in the development of the Role Construct Repertory (REP) Test (Kelly, 1955). The REP test permits an investigator to evaluate an individual's construct system in light of the significant persons in his life. Though the test was specifically designed for use in clinical settings, the general technique has provided new operational measures for such traditional areas of psychological interest as identification (Jones, 1961; Salmon, 1969), threat (Landfield, 1955), transference (Crisp, 1964; Sechrest, 1962), stereotyped thinking (Flynn, 1959), and thought disorder (Bannister, 1960, 1962, 1966; Bannister & Fransella, 1966). Extended discussions of Personal Construct Theory and the use of the REP test have been furnished by Bannister and Mair (1968), Bannister (1970), Bonarius (1965), and Landfield (1971).

The REP test has been extensively used in the experimental investigation of cognitive complexity. Cognitive complexity is a structural concept introduced and developed
by Bieri and his associates (Bieri, 1955, 1961; Bieri, Atkins, Briar, Leaman, Miller, & Tripodi, 1966; Tripodi & Bieri, 1963) to reflect the amount of differentiation in a person's interpersonal construct system. An individual who employs numerous, well differentiated constructs to construe and represent his interpersonal environment is thought to be cognitively complex; an individual who utilizes fewer constructs with little discriminability among them is considered to have a simple cognitive structure. Initial investigations (Bieri, 1955, 1961) indicated that individuals high in complexity maintain an orthogonal set of personal constructs, resulting in REP test scores which reflect the relative lack of any systematic relationship among the constructs in the system. Individuals low in complexity maintain less differentiated constructs, producing REP test scores which reflect considerable systematic relationship among the constructs in the system.

As an explanatory concept, cognitive complexity "is intended to indicate something about the person's structuring of his social world" (Bieri et al., 1966; p. 185). The generality of cognitive complexity has been empirically limited to the domain of interpersonal events and judgments; evidence demonstrates essentially no correlation between cognitive complexity and general measures of intelligence (Crockett, 1965).
Bieri has operationally restricted cognitive complexity to the number of differentiated constructs and the degree of articulation within the construct dimensions composing a cognitive system. Articulation is intended to reflect the number of intervals an individual is able to represent on a construct dimension. Crockett (1965), however, has argued that differentiation represents only one aspect of cognitive complexity. A complete explanation of complexity requires an understanding of the hierarchical integration of differentiated constructs. Crockett aligns his position with Werner's (1957) developmental view which characterizes growth as the progressive differentiation and articulation of a child's global, diffuse, and limited construct system into a hierarchically organized system of superordinate and subordinate concepts. In agreement with this position, the present study will use the term differentiation instead of complexity as the more precise identification of what is actually measured.

Kelly (1955) maintained that construct organization provides an individual with paths of inference and the potential means of resolving bits of otherwise contradictory information. An individual organizes his constructs, either by assigning priorities to those which will take precedence when contradictions arise (superordinate constructs), or by arranging inferential relationships among the constructs in the system. The
functional importance of an organized construct system rests on the assumption that without such organization, confusion and chaos would inevitably ensue. In this regard, Bannister (1960, 1962) reported that schizophrenics evidence a high degree of differentiation between their constructs but that their judgments tend to be unstable and inconsistent over time. These data led Adams-Webber (1970a) to conclude that it seems to follow that it cannot be differentiation alone which determines the level of functioning of a construct system but rather the progressive differentiation and reintegration of substructures at increasingly higher levels of abstraction [p. 37].

Although Kelly's approach recognizes that the individual engages in some form of hierarchical construct organization for his convenience in processing information, the specific nature of the organizational activity is unclear. Does the efficiency gained from construct organization result primarily from the stable, structural properties of the construct system? That is, do certain "a priori" construct relationships serve to organize the perception of events in the most efficient manner? Or is the formation of impressions and judgments more efficient when based on a construct system characterized by a high degree of independence among the constructs? The latter position implies that hierarchical construct organization
(the integration of a series of differentiated constructs) is defined as a structural outcome of a specific event rather than as a structural "given" within a construct system. This suggests that it is the flexibility of the construct system, and not the a priori organization of constructs which facilitates perceptual clarity and efficient performance.

Streufert and Fromkin (1972) note that while various approaches to cognitive complexity accept differentiation as a precondition for integration, integration is not consistently invoked as an important element in cognitive complexity research. This inconsistent emphasis is understandable in light of the fact that the KEP test was not designed to directly assess hierarchical construct organization. The REP test does, however, provide an element of organizational information in the form of construct clustering (Landfield, 1971). Assuming that highly related construct clusters represent a kind of predetermined or invariant structural organization, one can then ask what effect such structural organization has on the efficiency of information processing. If a fixed, structural organization contributes to the efficiency and clarity of judgment, then individuals exhibiting greater construct interrelatedness (low cognitive differentiation) should be the most efficient and accurate processors of information. If, on the other hand, a priori construct relationships pre-
clude the potential recombination of constructs, then individuals possessing a highly differentiated construct system should render more accurate judgments.

In general, empirical evidence indicates that as the systematic relationships among constructs increase, judgmental accuracy declines. Bieri (1955) reported that cognitive complexity was related to the accurate perception of differences between an individual and a second person \((r = .35)\), but was not related to the accurate perception of similarities \((r = .02)\). The inaccurate or unwarranted perception of similarities was inversely related to cognitive complexity \((r = -.40)\). Additional studies have demonstrated that high cognitive differentiation is related to the accurate prediction of another person's constructs (Adams-Webber, 1969), low scores on assimilative projection (Leventhal, 1957), more global and more confident impressions in the resolution of inconsistent information (Mayo & Crockett, 1964), clarity of impressions based on initial and additional information (Leventhal & Singer, 1964), efficiency of judging multidimensional stimuli (Tripodi & Bieri, 1964), the preference for moderate probability values (Higgins, 1961); and the perception of greater situational conflict (Tripodi & Bieri, 1966). It may be concluded that to the extent that an individual's constructs are relatively independent of each other, i.e., constructs are organized vis-a-vis a given judgmental situation,
judgmental accuracy increases and perceptual clarity is facilitated.

If differing cognitive structures (defined in terms of construct relatedness) influence the accuracy of interpersonal judgments, then it can be suggested that the nature of the judgmental process itself should vary as a function of cognitive structure. Specifically, highly differentiated individuals should process constructs which are representative of their system in a fashion characteristically different from undifferentiated individuals. An indication of the differing judgmental processes of differentiated and undifferentiated individuals can be found in a study by Slovic (1966). Slovic demonstrated that judges weight cues differentially according to the consistency of the relationship among the cues. When two cues which were believed to be highly correlated were consistent (both present or both absent), they were weighted heavily in the judgment task. On the other hand, when two cues believed to be correlated were presented in a logically inconsistent manner (one present and one absent), judges either ignored one of the cues or utilized other cues to a greater extent than was the case when no discrepancy existed.

On the basis of Slovic's results, if the construct dimensions of the highly differentiated individuals are truly unrelated (e.g., a happy person does not necessarily
imply a friendly person), then the presence of one construct pole (happy) in combination with another pole (unfriendly) would not represent an inconsistent relationship. When presented with a number of sets of independent constructs, the weights of the constructs should be stable across varying combinations of the constructs, resulting in judgments that closely adhere to a linear (additive) model. This is consistent with Anderson's (1971) conclusion that judgmental ratings will fit a strictly additive model when informational stimuli are completely independent in their action.

Conversely, if the constructs used by the undifferentiated individuals are truly related, then the consistency of input cues becomes very important; the weight associated with a particular cue will necessarily depend on the presence and absence of the remaining cues (Anderson, 1971). Following Slovic (1966), if two construct dimensions are related and inconsistent poles of these dimensions are presented (e.g., friendly and unhappy), the individual low in differentiation may ignore one of these cues or utilize other available constructs to a greater extent than when no discrepancy is present. According to Wiggins (1973) "such differential cue utilization is clearly nonlinear in nature" [p. 178]. Thus, if the undifferentiated individual is presented with periodic inconsistencies among sets of related construct dimensions, he should depart from a
strictly additive model and employ combination rules of a configural (nonlinear) nature.

The procedure utilized in the present study presented differentiated and undifferentiated subjects with a set of five bipolar construct dimensions taken directly from each of their REP tests. A complete factorial arrangement of the construct poles were presented, resulting in 32 configurations for each subject. Subjects were asked to indicate the degree of comfort they would feel if it were necessary for them to spend some time with a person possessing the attributes indicated in each presentation. These ratings were analyzed by an analysis of variance (ANOVA) model employed by a number of investigators (e.g., Anderson, 1969, 1971, 1972; Birnbaum, 1974; Hoffman, Slovic & Rorer, 1968; Milliment & Greenberg, 1973) to detect the presence of linearity and configurality in the judgment process. In the ANOVA model, a significant main effect for a cue implies that judgments varied systematically as a function of that cue. Alternatively, a significant interaction effect indicates that the judgment was made on the basis of two or more cues in combination, i.e., judgmental variation for one cue is a function of the level of at least one other cue.

Using ANOVA terminology, the predictions for the present study can be stated as follows: (1) Persons possessing a highly differentiated construct system form impressions
characterized by the simple additive effects of all inter­personal constructs, as evidenced by the predominance of significant main effects in the ANOVA of their judgments. (2) Persons possessing a highly undifferentiated construct system form impressions characterized by a configural orientation to the relevant interpersonal constructs, as evidenced by the predominance of significant interaction effects in the ANOVA of their judgments.

It is recognized that main and interaction effects may prove statistically significant yet still not account for a large part of the total variance of a judge's ratings. An omega-square ($\omega^2$; Kirk, 1968), computed for each significant main effect and interaction, provides an estimate of the proportion of judgmental variance accounted for by each effect. Consistent with the previous predictions, it was expected that (3) the variance accounted for by significant main effects is greater for persons possessing a highly differentiated construct system while the variance accounted for by significant interaction effects is greater for persons possessing a highly undifferentiated construct system.

Method

Subjects

One-hundred ninty-six students enrolled in an intro­ductory psychology course at the University of Nebraska at Omaha were administered a modification of Bierl's (Tripodi &
Bieri, 1963) REP test. Because of the small number of males enrolled in the participating classes (N=46), only female subjects were considered (N=150). From this population (REP test score \( \bar{X}=821, SD=220 \)), the 20 highest scorers (with scores at least +1 SD above the mean) and the 20 lowest scorers (with scores at least -1 SD below the mean) were selected for further investigation. These subjects were contacted by telephone and asked to participate in an experimental task requiring 30 minutes of their time. Because one of the low differentiation subjects declined to participate in the experiment, the high differentiation scorer who evidenced the lowest differentiation score was dropped in order to maintain equal group size (N=19).

**Materials**

Initially, Bieri's (1955) REP test procedure required a respondent to list 12 important persons in his life. The respondent was asked to consider three of these persons at a time and to indicate how two are similar and one is different for a particular construct of his choosing. This same construct was then used in judging each of the remaining persons on the list. In this manner, a total of 12 constructs were generated and applied to all 12 persons on the respondent's list. A measure of cognitive complexity was obtained by considering the similarity of each construct row to every other construct row in the matrix. If the
rows had similar patterns of ratings for all persons, regardless of the construct labels, the constructs were presumed to be functionally equivalent and were associated with low cognitive complexity. High cognitive complexity was associated with a highly dissimilar pattern of ratings across persons.

To facilitate measurement operations, Tripodi and Bieri (1963) developed a modified version of the REP test. Instead of requiring a respondent to generate his own set of persons and constructs, a set of 10 role categories (e.g., "person you dislike") and 10 bipolar constructs (e.g., "outgoing-shy") are provided to him. After deciding upon 10 persons who best correspond to the role categories, ratings are made using a Likert-type scale ranging from -3 to +3 (excluding a zero value) for each of the 10 persons on each of the 10 construct dimensions. Each rating in a row is compared with each rating directly below it (for the same person) yielding a measure of agreement. This procedure is performed for all possible comparisons within the same role category, and added together.¹

Although Bieri's modification of the REP test has received considerable acceptance, it appears that his scoring system has several faults. The major fault of Bieri's system is that in scoring one role category at a time, it is impossible to evaluate the presence of a systematic relationship among the construct dimensions.
For example, that an individual views his mother as happy and friendly does not constitute sufficient evidence to conclude that he views all (or even most) happy people as friendly. To effectively measure construct differentiation, it is necessary to compare the happy-sad dimension and the friendly-unfriendly dimension across all role categories. Secondly, Bieri's system requires that a rating of +3 (very happy) and -3 (very unfriendly) be scored to indicate differentiation (by virtue of the signs being different). If the two values were both -3 or both +3, they would be scored to indicate an undifferentiated relationship between the two construct dimensions. It should be clear, however, that these two examples should receive the same score as the sign of the rating is a false distinction and originates merely as a function of the arbitrary assignment of the construct dimension to the positive and negative poles of the rating scale. The present study used a scoring system devised by Millimet (1974, see Appendix A) which proposed to correct the deficiencies inherent in Bieri's scoring system.

In the present administration of the REP test, subjects were required to fill each of 10 specified role categories with one person from his social environment. From a provided list of 60 bipolar interpersonal construct dimensions, 15 were chosen by the subject as personally important to him. The 15 construct dimensions were then used to rate
each of the 10 persons. The rating scale for each construct
dimension ranged from +3 to -3, including a zero point, and
was intended to reflect a subject's judgment of where the
person being rated was seen on each of the construct dimen-
sions (e.g., more tense or more relaxed). The ratings
were scored for cognitive differentiation. A high total
score indicates that many of the 105 construct dimension
comparisons (15 constructs taken two at a time) evidence
some systematic relationship across persons and are thus
not differentiated from each other in the subject's current
usage. A low total score indicates that the subject's
construct dimensions are well differentiated, and do not
appear to be related across people. For this version of
the REP test, all negative values of the rating scale were
aligned with the construct pole which intuitively appeared
to be the least socially desirable pole.

Test-retest reliabilities for the REP test technique
have measured by various methods. Fjeld and Landfield
(1961), using normal subjects, reported the production of
similar constructs following a two week test-retest inter-
val for subjects given the same element categories (r=.79)
and for subjects given entirely new elements to evaluate
(r=.80). On the basis of total complexity scores, Tripodi
and Bieri (1963) reported high test-retest reliabilities
using provided constructs (r=.86) and generated constructs
(r=.76). In the present study, a correlation coefficient
A correlation of .89 (N=38) was found following a five week test-retest interval.

**Procedure**

Upon entering the testing situation, each subject was given a 64 page booklet and a set of instructions. Each page of the booklet contained the same five, bipolar construct dimensions which were taken directly from the subject's REP test. The particular five construct dimensions were selected because they best characterized the subject's differentiation level. That is, for subjects with low REP test scores, the five most mutually differentiated constructs were presented in the experimental task ($\bar{X}=2.76$). For subjects with high REP test scores, the five constructs which evidenced the least differentiation among each other were considered ($\bar{X}=19.74$).

The set of five bipolar constructs was presented to each subject 32 times. Each presentation was associated with a different combination of the construct poles, consistent with a completely crossed ($2 \times 2 \times 2 \times 2 \times 2$) factorial design. The five construct dimensions were presented in the same first to last order on each page with the placement of the positive and negative poles determined by the fully crossed methodology. The order of presentation for the 32 configurations was randomly determined for each subject. Each subject was required to respond to the 32 configurations a second time (in a different random order
of presentation) in order to determine intrajudge test-retest reliability and to establish an error term for the analysis of variance. For each configuration, the subject was given the following instructions. "Please assume that you are attending a social function and have just been introduced to a person whom you have never met. In the course of the conversation, it becomes clear to you that the person possesses those attributes which are circled below. After you have carefully considered all the attributes this person possesses, please indicate on a ten point scale how comfortable you would feel in the presence of this person if it were necessary for the two of you to spend a considerable amount of time together."

Ratings were made on a scale which ranged from 1 (extremely uncomfortable) to 10 (extremely comfortable). The task took from 15 to 30 minutes. Subjects were run in groups of one to six and testing was completed over a two to three week period.

Results and Discussion

Table 1 presents REP test scores, frequencies of significant main and interaction effects, omega-square values, correlation ratios, correlation coefficients, and intrajudge test-retest reliabilities for the differentiated and undifferentiated subjects. Mean test-retest reliabilities for the low (.82) and high (.70) differentiation groups were adequate and not significantly different (z=.83, p=.41).
The grand means of the 64 ratings of the low ($\bar{X}=5.06$) and high ($\bar{X}=5.40$) groups were not significantly different ($t=1.32$, $df=36$, $p=.20$), indicating that the average rating of comfortableness given to the stimulus configurations were similar for both groups. That is, the proneness to assign favorable ratings did not differ for the two groups.

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A separate ANOVA performed on the 64 ratings of each subject resulted in $F$ tests for five main effects (representing the individual construct dimensions) and 26 interaction effects (representing two or more construct dimensions in combination). It had been predicted that the number and kind of significant effects would vary as a function of the level of cognitive differentiation, i.e., the frequency of statistically significant main effects would be greater for the differentiated group, while the number of significant interaction effects was expected to be greater for the undifferentiated group. A 2 (low and high differentiation groups) x 2 (main and interaction effects) repeated measures factorial ANOVA performed on the frequencies of significant main and interaction effects obtained from the ANOVA table of each subject did not support the predicted interaction between groups and effects ($F<1$). The main effect for effects was highly significant ($F=19.58$, $df=1/36$, $p<.0001$), indicating that
most of the variation in a subject's ratings could be accounted for by main effects (\(\bar{X}=4.37\)) rather than interaction effects (\(\bar{X}=2.66\)). It must be recognized, however, that this comparison is biased in favor of interaction effects because of the greater possibility of their occurrence (26 to 5). Therefore, this effect must be considered to be an underestimate. Subsequently, an ANOVA done on the proportion of significant main and interaction effects associated with each subject's ratings resulted in a considerably greater effect (\(F=815.99, \text{df}=1/36, p<.00001\)).

This result strongly demonstrates the linear component in the judgments of all subjects; the five constructs presented in each configuration were evaluated independently of the constructs with which they were combined.

While the number of significant main effects associated with the undifferentiated (\(\bar{X}=4.68\)) and differentiated (\(\bar{X}=4.05\)) groups did not differ (\(F=1.24, \text{df}=1/36, \text{NS}\)), the number of interaction effects associated with the undifferentiated group (\(\bar{X}=3.21\)) was significantly greater than the number associated with the differentiated group (\(\bar{X}=2.00; F=4.56, \text{df}=1/36, p<.05\)). These effects make it clear that the significant main effect of groups (\(F=5.08, \text{df}=1/36, p=.03\)) was due primarily to the greater number of significant interaction effects associated with the undifferentiated group.

A 2 (low and high differentiation groups) x 2 (main
and interaction effects) repeated measures factorial ANOVA was performed on the omega-square values which were computed for each of the significant effects obtained in the individual ANOVAS. As before, it had been predicted that the variance accounted for by the significant main effects would be greater for the highly differentiated subjects, while the variance accounted for by the significant interaction effects would be greater for the undifferentiated subjects. The predicted interaction was not supported ($F=1.86$, $df=1/36$, NS). This analysis affirmed the previous analysis, indicating that the major portion of the total judgmental variance for both groups was accounted for by the significant main effects ($F=55.90$, $df=1/36$, $p<.0001$). However, the ANOVA for omega-square values revealed no group effect ($F=2.33$, $df=1/36$, NS) and despite the greater number of interaction effects found for the undifferentiated group, this effect was not mirrored in the analysis of the omega-square values ($F<1$). Taken together, these results indicate that while the undifferentiated group exhibited a greater number of significant interaction effects than did the differentiated group, the total judgmental variance of both groups was accounted for primarily by the main effects of each subject's ratings.

Although these results support previous findings which demonstrate that judgmental processes can be adequately accounted for by linear models (Dawes & Corrigan, 1974;
Goldberg, 1968; Hoffman, Slovic & Rorer, 1968; Millimet & Greenberg, 1973), attention has recently been given to the possibility that the predictive success of linear models may be due to certain measurement characteristics common to most experimental investigations rather than to the accurate reflection of the general nature of human judgmental processes. According to Dawes and Corrigan (1974) linear models work because the situations in which they have been investigated are those in which; (a) the predictor variables have conditionally monotone relationships to criteria (or may easily be rescaled to have such a relationship); (b) there is error in the dependent variable; (c) there is error in the independent variable; and (d) deviations from optimal weighting do not make much practical difference [p. 105].

While it is not necessary to detail all of these points, the issue concerning conditional monotone relationships is relevant to the present study and merits some elaboration.

A conditional monotone relationship exists if higher values of each variable predict higher values on the criterion, independently of the values of the remaining variables. This condition is the combination of two more fundamental measurement conditions: (a) independence (the ordinal relationship between each variable and the criterion is independent
the values of the remaining variables) and (b) monotonicity (the ordinal relationship is one that is monotone) (Dawes & Corrigan, 1974, p. 98).

It is likely that the independent variables (construct dimensions) considered in the present study maintained a monotonic relationship to the dependent variable (ratings of comfortableness). In general, an individual would presumably feel more comfortable with a trusting, friendly person than with a suspicious, unfriendly person; the more positive constructs which are present, the more comfortable would be the rating. Because of the strong positive and negative social values inherent in the bipolarity of each construct dimension, a monotonic relationship undoubtedly existed between the independent and dependent variable, thus establishing one of the conditions contributing to the present success of the linear model. Furthermore, there appears to be no theoretical reason to assume that the condition of monotonicity differed for the two experimental groups. In light of this, and recognizing the pervasive effect of social desirability on favorability ratings, it would have been more reasonable to expect no differences between the number of significant main effects obtained from the ratings of both groups.

Theory does suggest, however, that the condition of independence varies as a function of differentiation level. Cue independence can be assumed for the differentiated
group's construct dimensions because of the empirically determined lack of mutual relationships among them. On the other hand, the degree of mutual relationships evident among the construct dimensions of the undifferentiated group resulted in a failure to meet the condition of independence. The lack of cue independence contributed to the greater number of interactions, i.e., greater configurality, observed in the judgmental processes of this group, relative to the differentiated group.

The results of the ANOVA for the frequency of significant effects indicate that individual differences may exist in the strategies used to combine information. Specifically, while a linear model best accounts for the responses of people in general, persons who maintain undifferentiated construct systems evidence a significant nonadditive component in their judgmental processes when inconsistent information is presented. Alternatively, differentiated individuals adhere to a linear model of information processing primarily because inconsistency is a less likely occurrence.

The theoretical position of the present study suggests that the degree of inconsistent information present in the stimulus configurations may be a psychological factor contributing to the greater nonadditivitity present in the undifferentiated subject's ratings. The completely crossed factorial design used to generate cue configurations re-
sulted in all possible construct combinations. This procedure increased the likelihood of exposure to both evaluative and logical inconsistencies in at least some of the cue configurations, particularly when the stimulus cues were mutually related. It is practically impossible to determine which cue configurations represented inconsistent information for any one individual since the kind of relationship existing among the constituent cues may have a meaningfulness and system of logic which is unique to the individual who maintains them. Furthermore, this pattern of logic and meaning may not be generalizable to any other individual; constructs which are related in the cognitive structure of one individual may be functionally independent for another.

The manner in which individuals resolve inconsistencies, particularly in personality impression formation tasks is unclear. According to Anderson (1971) "if the informational stimuli are inconsistent, changes either in their meaning or their importance could reduce the inconsistency" [p. 199]. Changes in meaning are presumably reflected in scale value changes while changes in importance are mirrored as changes in the weight attributed to each stimulus component. Some evidence indicates that a process of discounting operates to reduce the weight placed on some of the cues (e.g., Anderson & Jacobson, 1965; Slovic, 1966) or that differential weighting may be associated with cues that are least
desirable (Birnbaum, 1974). An undifferentiated individual who maintains a construct system which includes, for example, construct relationships implying that trusting people are also friendly and interested-in-others would be confronted with an inconsistency. When faced with a trusting, friendly, but self-centered person. Theory suggests that undifferentiated individuals are confronted with this kind of inconsistency more frequently than those individuals who maintain differentiated construct systems. To resolve such an inconsistency, trusting, friendly, or self-centered might be discounted or self-centered may be differentially weighted. Alternatively, if discounting does not occur, decreases in scale values may result, i.e., the meaning of the component cues may be altered.

The combining of component cues appears somewhat simpler for the differentiated individual. Presuming that the constructs of trusting, friendly, and interested-in-others evidence no predetermined relationship for this person, then the conjunction of the three (regardless of which poles are present) need pose no real problem of consistency. The rating for the conjunction would be a simple additive function of the three stimulus scale values.

If the significantly greater number of interactions observed for the undifferentiated group can be taken as a reflection of differential stimulus cue weighting and/or changes in stimulus cue importance as a function of context,
then it may have been that the undifferentiated group experienced more inconsistency than did the differentiated group. Attempts to resolve the inconsistencies resulted in the observed nonadditive judgmental components.

It has been noted that an additive model can adequately account for the subject's ratings in general. To assess whether the additive function differed for the two groups (i.e., a curved or straight line function), a test of departure from linearity was computed for each subject's ratings (McNemare, 1969). Recognizing that the marginal means associated with each main effect serve as the best estimate of the scale values of the construct dimensions (Anderson, 1970, 1971, 1972), the square of the Pearson Product moment correlation of the scale values (averaged for each configuration of constructs) and the criterion ratings provides an estimate of the amount of linear variation accounted for in a judge's responses. This quantity is subtracted from the square of the correlation ratio (an estimate of the total judgmental variation, linear and nonlinear, accounted for in a judge's responses), yielding an index of the departure from linearity. It was expected that the mutuality of relationships among the construct dimensions of the undifferentiated group would eventuate in greater departure from linearity in their ratings. The analyses resulted in three significant ($p<.05$) departures from linearity in the high differentiated group and
nine ($p < .05$) in the low differentiated group. These values were treated as proportions and a test of significance for uncorrelated proportions resulted in a statistically significant difference ($z = 2.09, p < .03$). This difference was also reflected in the combined data for the two groups. The test for departure from linearity was significant for the undifferentiated group ($F = 1.95, df = 22/32, p < .04$) and nonsignificant for the differentiated group ($F = 1.37, df = 22/32, p = .20$). Thus, the ratings of the differentiated group appear to adhere to a linear, additive function while the ratings of the undifferentiated subjects, as a group, evidenced significant departure from a straight line function.
References


Crisp, A. H. An attempt to measure an aspect of "transference". *British Journal of Medical Psychology, 1964, 37, 17-30.*


Salmon, P. Differential conforming as a developmental


NOTES

1 The procedural differences between Bieri (1955) and Tripodi and Bieri (1963) raise an important methodological issue, i.e., the use of elicited versus provided construct dimensions. It can be argued that a set of provided constructs may not be consistent with the individual's personal construct system, thereby reducing the reliability and validity of his interpersonal judgments. That is, to the extent that provided constructs are not representative of the individual's personal construct system is the extent to which the resulting complexity score is rendered meaningless. However, Kieferle and Sechrest (1961) and Tripodi and Bieri (1963) have shown that an individual's use of provided constructs is functionally equivalent to the way in which he would use elicited constructs. Jaspars (1964) furnished further justification for the use of provided constructs when the subject population is comprised of "normal" individuals. Nevertheless, the present study utilized a compromise procedure in which a list of 60 constructs were provided from which the respondent was asked to select 15 construct dimensions which she frequently used in describing and thinking about the people in her interpersonal environment.

2 Bieri's scoring system yields a measure of the differentiation among persons (columns) in an individual's social environment. While Millimet's system assesses the degree
of differentiation among constructs (rows), a correlation coefficient of .67 (N=101) was obtained between the two systems. Concerning the relationship between the columns and rows of the REP test, Adams-webber (1970b) has reported correlation coefficients of .89 and .99 using two different scoring techniques. It appears that the row and column structural indices are functionally equivalent. The somewhat lower correlation between the Bieri and Millimet systems may be accounted for by the different mathematical operations used to derive the scores.
TABLE 1

REP Test Scores, Frequencies and Omega-Square Values ($\omega^2$) of Significant Effects, Correlation Ratios ($\eta^2$), Correlation Coefficients ($r^2$), and Intrajudge Test-Retest Reliabilities ($r_{tt}$) for the High Differentiated Subjects

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$\bar{X}$ 4.05 2.00 .68 .06 .85 .68 .70

**$P<.05$, $F$ = Departure from Linearity
TABLE 1 (Cont.)

REP Test Scores, Frequencies and Omega-Square Values ($\omega^2$) of Significant Effects, Correlation Ratios ($\eta^2$), Correlation Coefficients ($r^2$), and Intrajudge Test-Retest Reliabilities ($r_{tt}$) for the Low Differentiated Subjects

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$\bar{X}$  4.68  3.21  .75  .06  .90  .69  .82

**p<.05, $F$ Departure from Linearity

*p<.08, $F$ Departure from Linearity
Appendix A

A MODIFICATION OF GEORGE KELLY'S ROLE CONSTRUCT REPERTORY (REP) TEST FOR MEASURING COGNITIVE DIFFERENTIATION

C. Raymond Millimet

University of Nebraska at Omaha

Test Administration

The respondent is asked to complete a 10 x 15 matrix where the 10 columns represent role categories (e.g., mother, person you dislike) and the 15 rows represent construct dimensions. The construct dimensions are selected by the respondent from a list of 60 bipolar constructs provided by the experimenter (e.g., honest-dishonest, shy-outgoing).

The respondent is asked to select a person from his environment who corresponds to each of the 10 role categories. The name or initials of each person is written in the space provided above the appropriate column. Each name must represent a real person and may not be used more than once.

The respondent is asked to consider each construct dimension, one at a time, and provide a rating for each of the 10 persons he has selected, using a rating scale from -3 to +3 (including zero).

Scoring

The amount of differentiation between any two construct dimensions is determined by subtracting algebraically the
rating for one construct, for a given role category, from the rating of another construct dimension, for the same role category. This procedure is repeated for each of the remaining role categories resulting in 10 separate values. The sign of each value is not considered thereafter.\(^1\)

Each of the 10 values is compared to every other value. One point is scored for every equivalent pair of values among the 45 possible pairings (10 values taken two at a time). This results in a differentiation score ranging from 3 to 45 for the two construct dimensions under consideration. The smaller the score, the greater the differentiation among the 2 construct dimensions.\(^2\)

This procedure is performed for each of the 105 pairings of the 15 construct dimensions. The total score can range from 0 to 4410. The smaller the total score, the greater the differentiation among the 15 construct dimensions.

\(^1\)Because of the arbitrary assignment of the poles of a construct dimension to the positive and negative poles of the rating scale, the resulting signs of the difference scores are irrelevant for determining the differentiation score between the two construct dimensions under consideration.

\(^2\)By virtue of using a rating scale which ranges from -3 to +3, the maximum number of different values that can be obtained by the subtraction procedure is seven (6, 5, 4, 3, 2, 1, 0). Therefore, some set of three values must be repeated, leading to a minimum differentiation score of three. In order to eliminate this artifact, a score of three is subtracted from the initial differentiation score, resulting in a final differentiation score ranging from 0 to 42.
Example

Consider the following two construct dimensions and the ratings made from them to the role categories.

Role Categories

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<td>+2</td>
<td>+1</td>
<td>-1</td>
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</tbody>
</table>

Shy—Outgoing
Dishonest—Honest

Subtracting the second set of ratings from the first set of ratings results in the following set of difference scores: +2 -1 -1 +2 -1 +1 +1 -4 -2 +4

Discontinuing the sign results in the following set of values: 2 1 1 2 1 1 1 4 2 4

Comparing each value against every other value, scoring one point for each equivalent pair, results in a score of 11 (14-3).

Cognitive Structure

In addition to their contribution to the total differentiation score, the 105 separate differentiation scores can be used to provide a schematic representation of the respondent's construct system. Differentiation scores which are at least plus or minus one standard deviation units are of special interest as each indicates a pair of constructs which are highly related or unrelated, respectively. A graphic representation of these constructs would reflect the quality and degree of the structural organization maintained by the respondent.
REP TEST INSTRUCTIONS

A. Select a person from your life who corresponds to each of the 10 role categories enumerated below and write that person's first name or initials in the space provided for it. Each name should represent a person you know well. DO NOT USE THE SAME PERSON FOR MORE THAN ONE CATEGORY.

Role Categories

1. Mother or a person who is most like a mother to you.
2. Father or a person who is most like a father to you.
3. Brother nearest your age. If you do not have a brother, choose a person who is most like a brother to you.
4. Sister nearest your age. If you do not have a sister, choose a person who is most like a sister to you.
5. Husband or wife. If you are not married, choose a close friend who is the opposite sex from you.
6. Close friend who is the same sex as you.
7. Person you dislike who was once your close friend.
8. Person who for some reason seems to dislike you.
9. Person who makes you feel uncomfortable.
10. Boss or person who holds a position of authority over you.
B. Select 15 bipolar adjective dimensions from the following list (next page). Make your selection on the basis of the strength and frequency with which you use these dimensions in describing or thinking about the various people in your life. Write these adjective dimensions in the 15 spaces provided for them. For example, if you frequently use the dimension "shy—outgoing," write SHY in the space associated with the column headed by -3, -2, -1 and OUTGOING in the space associated with the column headed by +1, +2, +3. Repeat this procedure for each of the 15 bipolar adjective dimensions that you select.

C. Now that you have completed the task of assigning persons and adjective dimensions, consider the first adjective dimension and rate each of the 10 persons on the basis of the rating scale which ranges from -3 to +3 including a zero value. Repeat this procedure for each of the remaining adjective dimensions.
1. tense--relaxed
2. unintelligent--intelligent
3. insulting--respectful
4. close-minded--open-minded
5. conformist--individualist
6. unaware--perceptive
7. timid--forceful
8. inconsiderate--considerate
9. immoral--moral
10. pessimistic--optimistic
11. lazy--industrious
12. conceited--modest
13. prejudiced--unbiased
14. confused--clear-thinking
15. unsuccessful--successful
16. unattractive--attractive
17. serious--fun-loving
18. inefficient--capable
19. frustrated--satisfied
20. naive--sophisticated
21. critical--accepting
22. uninhibited--self-controlled
23. disloyal--loyal
24. rough--gentle
25. conservative--liberal
26. unconvincing--persuasive
27. uneducated—knowledgeable
28. shy—outgoing
29. suspicious—trustling
30. childish—mature
31. cruel—kind
32. dishonest—honest
33. sad—happy
34. self-centered—interested in others
35. rude—polite
36. cautious—daring
37. irrational—rational
38. unpatriotic—patriotic
39. submissive—dominant
40. dependent—independent
41. idealistic—realistic
42. aggressive—mild-mannered
43. moody—even-tempered
44. undependable—dependable
45. unfriendly—friendly
46. stingy—generous
47. cowardly—courageous
48. resentful—forgiving
49. nonreligious—religious
50. disorganized—organized
51. indecisive—decisive
52. boring—interesting
53. powerless— influential
54. rebellious— obedient
55. unpredictable— predictable
56. excitable— easy-going
57. stubborn— cooperative
58. quiet— talkative
59. apathetic— concerned
60. maladjusted— adjusted