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Cognitive differentiation and trait anxiety as a function of conceptual level

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COGNITIVE DIFFERENTIATION AND TRAIT ANXIETY
AS A FUNCTION OF CONCEPTUAL LEVEL

A Thesis
Presented to the
Department of Psychology
and the
Faculty of the Graduate College
University of Nebraska at Omaha

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts

by
George T. Brennan
August 1973
THESIS ACCEPTANCE

Accepted for the faculty of The Graduate College of the University of Nebraska at Omaha, in partial fulfillment of the requirements for the degree Master of Arts.

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TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Introduction</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypotheses</td>
<td>23</td>
</tr>
<tr>
<td>Method</td>
<td>23</td>
</tr>
<tr>
<td>Subjects</td>
<td>23</td>
</tr>
<tr>
<td>Measures</td>
<td>24</td>
</tr>
<tr>
<td>Procedure</td>
<td>26</td>
</tr>
<tr>
<td>Results</td>
<td>28</td>
</tr>
<tr>
<td>Discussion</td>
<td>32</td>
</tr>
<tr>
<td>References</td>
<td>45</td>
</tr>
<tr>
<td>Footnotes</td>
<td>56</td>
</tr>
<tr>
<td>Tables</td>
<td>57</td>
</tr>
<tr>
<td>I. Group Mean Interpersonal Cognitive Complexity Scores for R-S Levels</td>
<td>57</td>
</tr>
<tr>
<td>II. Means and Standard Deviations of State Anxiety on the Four Conceptual Levels</td>
<td>58</td>
</tr>
<tr>
<td>III. Means and Standard Deviations of Cognitive Differentiation on Conceptual Level, Intensity, and Regard</td>
<td>59</td>
</tr>
<tr>
<td>IV. An Analysis of Variance of Cognitive Differentiation Scores for Intensity, Concreteness-Abstractness, and Regard</td>
<td>60</td>
</tr>
<tr>
<td>V. Means and Standard Deviations for Trait Anxiety on the Four Conceptual Levels</td>
<td>61</td>
</tr>
</tbody>
</table>
VI. An Analysis of Variance and Trend
Analysis of Trait Anxiety Scores for the Four Conceptual Systems 62

VII. Means and Standard Deviations of Cognitive Differentiation Scores for the Three Levels of Trait Anxiety 63

Figures 64

1. Trait Anxiety as a Function of Conceptual Level 64

2. A Comparison of Cognitive Differentiation Scores from Wilkins et al. and the Present Study as a Function of Trait Anxiety 65
COGNITIVE DIFFERENTIATION AND TRAIT ANXIETY
AS A FUNCTION OF CONCEPTUAL LEVEL
George T. Brennan
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In recent years, there has been an increasing interest among personality investigators in a cognitive orientation to personality. Several theorists and researchers have begun to relate the study of cognition and "cognitive structures" to personality dynamics (Suedfield, 1971) and to personality development (Bieri, 1966). Suedfield (1971) and Bieri (1966) noted the lack of systematic, intensive research into relationships among cognitive personality variables, but their articles portend an increase in such investigations.

Three areas of interest in cognitive-personality research provide the investigative framework for the proposed study. These are (a) interpersonal cognitive complexity (Bieri, 1961; Bieri, Atkins, Briar, Leaman, Miller, & Tripodi, 1966); (b) Conceptual Systems Theory (Harvey, Hunt, & Schroder, 1961); and (c) trait anxiety (Spielberger, 1966).

Bieri (1961) introduced the term "cognitive complexity" in reference to the amount of differentiation among the dimensions of a person's cognitive structure. Cognitive structure refers to the "relatively enduring patterns of organization in the person's representation of the social and physical environment [Bieri et al., 1966, p. 12]."

A person who has numerous, well-differentiated constructs to construe and represent his social world is considered cog-
natively complex, while a person with relatively few dimensions and with little discriminability among them is considered to have a "simple" cognitive structure. As a measure of cognitive complexity (differentiation), Bieri et al., (1966) developed a version of Kelly's (1955) Role Construct Repertoire (REP) test.

A second theoretical approach to structural complexity emphasizes the integration of differentiated dimensions (e.g., Harvey et al., 1961; Schroder, Driver, & Streufert, 1967). This position has been most prominently represented by the Conceptual Systems Theory of Harvey et al. (1961). Conceptual Systems Theory (CST) is a conceptualization of individual differences in cognitive structure, emphasizing integrative complexity "as a synthesis of specialized functions, similar to the Hegelian synthesis of thesis and antithesis [Streufert & Fromkin, 1972, p. 154]."

Specifically, according to CST, an individual is thought to develop conceptually (given optimal environmental conditions) by passing through a series of four systems of cognitive functioning (conceptual levels), ranging from highly concrete modes of thinking to highly abstract modes (Harvey et al., 1961).

Harvey (1970) described this concreteness-abstractness dimension as

...a quality of how the individual articulates and organizes or differentiates and integrates his concepts of ego-involving content (Harvey, 1967; Felknor & Harvey, 1970; Harvey et al., 1961). Concreteness-abstractness
refers to a superordinate conceptual dimension which encompasses a number of more molecular organizational attributes, such as degree of differentiation, extent of integration, and centrality of the conceptual elements. Thus variation in concreteness-abstractness rests upon differences in patterning and organization and not on differences in the algebraic sum of these subordinate characteristics [p. 69].

Complete theoretical descriptions of the four systems of conceptual complexity may be found in Harvey et al. (1961), while summaries of their empirical descriptions and correlates were included in Harvey (1966) and in Greaves (1971a).

Very briefly, the systems may be described as follows:

System 1 persons are cognitively simple and concrete, use extreme judgments, are rigid, unable to change set readily, oblivious to subtle cues, dogmatically obedient to persons of high status and authority, and remain rigidly tied to externally defined sets of rules for social behavior.

System 2 persons are somewhat more differentiated and integrated than System 1 representatives. System 2 persons tend to distrust and dogmatically oppose social institutions. They generally dwell on the negative aspects of authority, choosing to remain closed to any potential good it may have.

System 3 persons have been described by Harvey (1970) as being

...more abstract, less dogmatic, less pro- or anti-establishment, and less evaluative than individuals from either System 1 or System 2. At the same time they are more concerned with interpersonal harmony, empathic understanding, mutual dependencies, and highly developed skills of interpersonal manipulation aimed at averting social isolation, aloneness, interpersonal rejection and failure when having to perform alone [p. 71].
System 4 is the most abstract of the four systems. Persons at this level may be characterized by "high task orientation, information-seeking, low dogmatism, creativity (in the sense of offering problem solutions that are high in both novelty and appropriateness), openness to inputs from diverse sources and a high independence of judgment [Harvey, 1970, pp. 71-72]."

Assessment of these conceptual systems has been accomplished with several measures: the Paragraph Completion Test (PCT) (Schroder et al., 1967); the Interpersonal Topical Inventory (ITI) (Tuckman, 1966); and the This-I-Believe (TIB) test (Harvey, 1964, 1965, 1966; White & Harvey, 1965). Harvey (1970) also developed an objective instrument, but Greaves (1971a) concluded that the TIB is the "better of the two."

The relationship between differentiation and integration has been a source of theoretical and empirical confusion in the study of cognitive complexity. Streufert and Fromkin (1972) noted that although the two approaches seem to agree that differentiation is a precondition for integration, they do not appear to agree that integration is necessarily (always) associated with differentiation.

Witkin, Dyk, Faterson, Goodenough, and Karp (1962) state that development toward greater differentiation must be accompanied by successively more complex reintegration of the (perceptual or decision-making) system. Theorists who are more concerned with integration (e.g., Harvey et al., 1961) view differentiation as a necessary but quite insufficient precondition for integration [Streufert & Fromkin, 1972, p. 154].
Adams-Webber (1970a), elaborating Kelly's personal construct theory, noted that some persons (especially schizophrenics) might be highly differentiated but have little or no functional integration, resulting in a level of experience which is "hopelessly kaleidoscopic and discontinuous [p. 37]." He concluded 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]."

This description of the relationship between differentiation and integration is most consistent with the theoretical position proscribed by CST. According to Harvey et al. (1961) and Schroder et al. (1967), cognitive differentiation should increase through the first three systems types (and through the initial transition into System 4), but at System 4, structural integration and articulation become crucial.

Whatever the actual relationship between differentiation and integration, one would expect some positive correlation between personality measures of the two concepts. Harvey (1966) reported a positive linear relationship between conceptual level (CL) scores on the TIB and differentiation scores on a modified REP test. Brennan found a similar relationship between TIB scores and differentiation scores on a test similar to one used by Crockett (1965). These relationships were found by simply noting that System 4 Ss had the highest mean differentiation scores, followed, in descending order, by Systems 3,
2, and 1. However, Brennan found a correlation coefficient of only +.21 between the two measures. Other studies (see Streufert & Fromkin, 1972) have also shown little correlational relationship between measures of structural integration (like the TIB and PCT) and Bieri's modified REP test of differentiation. Factorial studies by Vannoy (1965) (who reported a correlation of +.05 between the PCT and Bieri's test) and others (e.g., Faletti, 1968; Gardiner, 1968) have shown measures of integration (PCT, ITI, TIB) to define a factor "relatively unrelated to cognitive differentiation" [Schroder, 1971, p. 259]. In addition, Harvey, Reich, and Wyer (1968) found that concrete (Systems 1 and 2 combined) and abstract (Systems 3 and 4 combined) Ss did not differ significantly in differentiation scores.

Apparently, the two kinds of complexity tests measure unique facets of cognitive structure. When the tests are paired, integrators produce fewer dimensions on the REP test, and differentiators score moderately low on a test of CL, since such a test is primarily geared to measure degrees of integration (Streufert & Fromkin, 1972, p. 154).

A third area of interest in cognitive-personality research involves a specific structural tendency (see Schroder, 1971) of individual conceptual systems—manifest or trait anxiety. Trait anxiety has been defined (Spielberger, 1966) as an individual's anxiety-proneness—i.e., his predisposition to experience a state of anxiety in response to threatening stimuli. Anxiety as a personality trait has been
typically investigated on the basis of scores on the Taylor (1953) Manifest Anxiety Scale (MAS). Two scales which have been shown to be highly related to the MAS are the Byrne (1964) Repression-Sensitization (R-S) Scale (r=+.91, Joy, 1963; Sullivan & Roberts, 1969) and the Millimet (1970) Manifest Anxiety-Defensiveness (MAD) Scale (r=+.92 for both males and females, Millimet, 1970).

These three scales treat various aspects of an individual's affective-motivational states as reflected by a true-false questionnaire. The scale questions ask the person to admit to or assess the amount of emotional or physical discomfort he typically experiences. The assumption is that if a person admits to a considerable number of mental and physical difficulties, then anxiety and defensive style must play a role in determining his behavior.

Though the R-S and MAD scales are nearly identical (r=.94 for males, r=.97 for females, Millimet & Cohen, 1973), Byrne and Millimet have disagreed over interpretation of individual scores. Byrne conceptualized the R-S dimension in terms of a person's characteristic defensive mode of response to threatening stimuli, ranging from repressive-denying modes of defense (Repression) to obsessive-compulsive ones (Sensitization). Millimet (1970, 1972), on the other hand, suggested that two factors account for MAD scores: trait anxiety and defensiveness (ability to avoid threatening stimuli). These two factors are presumed to vary inversely, with low scorers (repressors) being low in anxiety with high avoidance ability
and high scorers (sensitizers) being high in anxiety and low in avoidance ability.

Support for Millimet's interpretation was provided by Warr and Knapper (1968) who cited several studies (Altrocchi, 1961; Gordon, 1957; Lazarus, Erikson, & Fonda, 1951) which indicated that a repressor is a person who does not (or cannot) express recognition of threatening or unpleasant aspects of his life; he is one who scores high on defensiveness scales but low on manifest anxiety. Conversely, sensitizers express more emotional stress, scoring low on defensiveness and high on manifest anxiety.

Moreover, Millimet (1970) argued that, among the three scales (R-S, MAS, MAD), "the MAD scale appears to be the most suitable alternative. Not only does the MAD scale reflect the highest factor loadings and exhibit higher estimates of reliability among these scales, but the development of a form for males and a form for females removes the possibility of confounding scale content with sex [pp. 613-614]."

Accordingly, the MAD scale was used in the study reported here. Since defensiveness was not an issue in the present study, the interpretation of MAD scores was confined to an estimation of trait anxiety.

The relationship between trait anxiety and cognitive complexity has been a subject of recent theoretical and research interest. It has been suggested (Bieri, 1971; Warr & Knapper, 1968; Stotland & Canon, 1972) that trait anxiety and cognitive complexity (differentiation) are positively correlated,
possibly due to the larger number of alternative ways of perceiving available to the more complex individual. In other words, a person with a greater number of concept dimensions with which to construe his environment is theoretically more likely to perceive conflicting (and hence potentially threatening) stimuli, and thus he is more susceptible to trait anxiety.

The relationship between trait anxiety and cognitive complexity has been investigated by several recent studies (e.g., Bergquist, 1970; Lewinsohn, Flippo, & Bergquist, 1970; Wilkins, Epting, & Van De Riet, 1972). The results of these investigations reflect an inconsistency similar to that found in the research with differentiation and integration. The studies cited indicate a positive relationship between trait anxiety (as measured by the R-S scale) and various measures of cognitive complexity. Wilkins et al. (1972) reported that sensitizers and neutrals were both higher in differentiation scores than repressors. However, Bieri et al. (1966) reported a correlation coefficient of only -.16 between trait anxiety (MAS) and scores on Bieri's test of differentiation.

Again, this apparent inconsistency might be attributable to characteristics of the different tests used. However, it is doubtful that the solution to this problem will be that simple. The thesis of this study was that these differences might be better understood when placed in the context of Conceptual Systems Theory. Before elaboration of that thesis,
a more extensive consideration should be given to the study by Wilkins et al. (1972), the most recent and relevant published study relating trait anxiety and cognitive differentiation.

In addition to the hypothesized linear relationship between trait anxiety (R-S) and cognitive complexity, the Wilkins study sought confirmation of a "vigilance hypothesis" of interpersonal relations: "an individual differentiates more finely among negative, anxiety-evoking stimuli persons in order to gain greater understanding and predictability concerning ... potentially dangerous individuals [p. 450]."

In the Wilkins study, 82 undergraduate Ss were administered the R-S scale and divided up into three groups: repressors (n=24) below the 25th percentile; sensitizers (n=15) above the 75th percentile; and neutrals (n=43) between these two points. The Ss then completed the interpersonal cognitive complexity grid (Bieri et al., 1966). Each S named 10 persons from his social environment to fit preselected role categories and then rated each stimulus person along 10 bi-polar dimensions (e.g., outgoing-shy) on a scale ranging from -3 to +3 with no 0 value. Complexity scores resulted from comparison of ratings (points scored for agreement of ratings). The results, as reported by Wilkins et al. (1972), are summarized in Table I.

Insert Table I about here

Since agreement between ratings indicates functional overlap of construct dimensions, low total scores indicate
cognitive complexity (high differentiation) and high scores indicate cognitive simplicity (low differentiation). A significant difference was found between scores at the three R-S levels \( (F = 4.41, df = 2/79, p < .025) \). Multiple comparisons revealed that both neutrals and sensitizers were more complex in terms of differentiation scores than were repressors. In other words, Ss middle and high in trait anxiety were significantly better than low scorers in being able to differentiate persons in their interpersonal environment. Over all Ss, negative role categories were differentiated significantly more than positive role categories. Thus, both major hypotheses were supported by the data.

Upon close analysis and comparison with related studies, however, several problems become apparent with the Wilkins study. Three possible problem areas should be considered: (a) attitude direction and intensity, (b) measurement properties of the two instruments used, and (c) selection of the sample population.

First, although the direction of Ss' attitudes was varied, a neutral category was not used, negating the possibility of looking at potential differences as a result of different intensities of attitude. Harvey, Reich, and Wyer (1968) investigated the interaction of attitude direction and intensity upon cognitive differentiation. Their results indicated that attitude direction (positive-negative) had no significant effect on responding, as the neutral category produced more differentiation than either of the other two categories.
Furthermore, intensity of attitude was found to be a significant factor affecting differentiation.

These contradictory results bring the "vigilance" hypothesis into question. This area of investigation has been widely explored, with mixed results. In addition to the Wilkins study, several others (e.g., Harvey, Wyer, & Hautaluoma, 1963; Irwin, Tripodi, & Bieri, 1967; Miller & Bieri, 1965) have found that stimuli associated with negative affect are differentiated best. On the other hand, Crockett (1965) cited a study by Supnick (1964) which found liked persons to be better differentiated than disliked persons—i.e., positive stimuli persons were more easily differentiated than negative stimuli persons. Irwin et al. (1967) noted that the conflicting results reported by Crockett may have been due to the fact that a different method of measuring cognitive complexity was used.

In either case, the results of Harvey, Reich, and Wyer (1968) seriously question the validity of results from studies which have not considered attitude intensity. It appears that when intensity is controlled for (as in Harvey et al., 1968), the effect of attitude direction vanishes.

A second potential problem with the Wilkins study involves a measurement property apparently shared by the two instruments used. Byrne's R-S scale has been repeatedly shown to be strongly tied to social desirability (Abbott, 1972; Bernhardtson, 1967; Silber & Grebstein, 1964; Millimet, 1970, 1972; and others), with the correlation usually stronger than
.90 (i.e., low scores on the R-S scale are associated with socially desirable response sets). Socially desirable response sets have also been shown to be negatively associated with cognitive complexity as measured by Bieri's differentiation test (Bieri, 1965, 1971; Vannoy, 1965). In an effort to minimize the effects of response set, Vannoy (1965) used a modified version of Bieri's test. Vannoy found that the difference in response set correlations between the original and modified versions indicated a reduction in potential response set confounding for the modified version. Since both the R-S measure and Bieri's test contain this potentially confounding element, such a modification as that used by Vannoy seemed useful and was employed in the present study.

A third area of possible concern has to do with the selection of the subject population. Greaves (1971a, 1972) stressed the need for controlling for systematic cognitive differences by selecting Ss on the basis of conceptual level, as defined by Conceptual Systems Theory.

Greaves (1971a) reviewed the relevant facets of CST and their implications for research in cognitive psychology. He suggested that the empirical evidence supporting CST has indicated that the theory can predict differential results in cognitive tasks as a function of CL. He pointed out that CST "demonstrates ... that there are major, systematic subgroup differences present in many experiments, which have heretofore been treated as random differences [p. 58]."
Greaves also noted that the four conceptual systems are not normally distributed in any given (randomly selected) population. Harvey (1970) reported the following distribution of system types among several thousand liberal-arts college students: System 1, 35%; System 2, 15%; System 3, 20%; and System 4, 7% (the rest were mixed or transitional types). Greaves (1971a) concluded that it becomes very difficult to determine the external validity of results (especially in experiments focusing on cognition) when E fails to control for cognitive type.

In contrast to Wilkins et al. (1972), the study by Harvey et al. (1968) provided an example of differences in result which may be attributable to systematic sampling bias. Selecting Ss on the basis of CL (as noted earlier in this paper), Harvey et al. (1968) investigated differentiation as a function of both attitude direction and intensity. While the Wilkins study showed a significant difference in differentiation scores as a function of attitude direction, the Harvey study reported no effect of varying regard, but their results did show a strong effect for intensity of attitude.

This difference in result may be explained in several ways, including: (a) differences in measurement techniques used in the two studies, and/or (b) differences in the sample population.

The methods of measurement in the studies differed in several ways. First, the dimensional differentiation scores were elicited by different tests (although both were modifi-
cations of the HEP test). Wilkins et al. (1972) provided the role categories as used in Bieri's modification (see earlier description). In addition, the dimensions Ss used for judgment were provided, i.e., preselected by the E. In the Harvey study, however, the dimensions used were "social beliefs" and "interpersonal relations" (instead of stimulus persons), and specific beliefs to be rated were selected by the Ss along with the dimensions on which they were judged.

Adams-Webber (1970b) discussed the relative merits of measuring cognitive complexity with elicited versus provided construct dimensions. Drawing from an extensive review of the literature, he suggested that "normal subjects, at least, exhibit approximately the same degree of differentiation in using carefully selected supplied lists of adjectives as when they employ their own elicited constructs [p. 352]." With respect to the two studies in question, even though there were potentially relevant differences, the samples used were selected from normal populations.

A more important difference in the measurement procedures might have been in the stimuli Ss were required to differentiate. Harvey et al. (1968) used beliefs and relations, while Wilkins et al. (1972) used stimulus persons assigned to provided role categories.

In addition, the differentiation task in the Harvey study was a far more complex and demanding task. In the Wilkins study, Ss merely rated each of 10 persons on 10 provided dimensions. In Harvey's study, however, Ss believed they
were participating in the construction of a "perception test." The Ss selected 24 social beliefs (eight each of positive, negative, and neutral regard) and then rated them on eight attributes they had selected as important in describing those beliefs. This procedure was repeated for 24 "interpersonal relations," so that each S generated 48 stimuli and 16 attributes and then waded through the resulting grid in a rating procedure. Finally, Ss rated the intensity of their feelings toward each stimulus domain instance.

Thus, the differences in the demand of the tasks in the two studies appears to have been substantial and quite possibly affected the results. Accordingly, one purpose of the present study was to replicate the study by Harvey et al. (1968), substituting a modification of Bieri's (1966) measure of cognitive differentiation.

The major purpose of the present study was to investigate the relationships between trait anxiety, cognitive differentiation, and conceptual complexity (integration or concreteness-abstractness). This appeared to be a formidable task, as the literature on such relationships was small, and the studies available (mostly relating R-S to cognitive differentiation) were equivocal because of some of the problems discussed here.

An example of this difficulty involves the discussion of the relationship between R-S as a measure of "personal adjustment" and R-S as it relates to cognitive differentiation.

Millimet (1972) and others (Bergquist, 1970; Byrne, 1964;
Dana & Cocking, 1968) have cited numerous studies indicating a strong linear relationship between tendency toward high trait anxiety scores and maladjustment. This trend has been demonstrated with numerous measures of personal adjustment, including the California Personality Inventory (Byrne, Golightly, & SheffIELD, 1965), the Gough and Heilbrun (1965) Adjective Check List (Hoffman, 1970), the MMPI (Millimet, 1970), the Rotter (Rotter & Rafferty, 1950) Incomplete Sentences Blank (r = +.73 with the R-S scale, Tempone & Lamb, 1967; r = +.70 with the MAD scale, Millimet, 1972), and various self-description measures (Altrocchi, Parsons, & Dickoff, 1960; Byrne, 1961; Lucky & Grigg, 1964). In addition, normal populations have been shown to score significantly lower on measures of trait anxiety than students seeking counseling (Tempone & Lamb, 1967), those seeking therapy (Thelen, 1969), and psychiatric patients (Feder, 1967; Millimet, 1970).

Millimet (1972) also noted that several factorial studies have established a unitary relationship between trait anxiety and general maladjustment or neuroticism (e.g., Bendig, 1960; Eysenck, 1957; Kassebaum, Couch, & Slater, 1959; LaForge, 1962). On the basis of such findings, Sarason (1960) concluded that "the scales of anxiety are tapping tendencies toward neuroticism, maladjustment, and self-dissatisfaction [p. 410]."

Assuming that both adjustment and cognitive differentiation are desirable states for individuals to attain, then these results and the previously cited relationship between differentiation and trait anxiety seem to be contradictory. This
apparent inconsistency was elaborated by Bergquist (1970) who, in suggesting an "interpersonal-cognitive approach to the R-S construct," concluded:

Whereas repressors appear to be oriented toward and exhibit considerable facility in interacting with other people, sensitizers are "primed" toward viewing themselves and others in a negative light and exhibit little facility in interpersonal activities. The sensitizer is described as one who is "alienated" from other people, from society, and even from himself. In contrast, sensitizers rather consistently exhibit greater facility than repressors in their cognitive operations upon various types of stimuli—particularly those stimuli which are vaguely experienced or complex. Thus while sensitizers appear to be less "adjusted" than repressors in one dimension (interpersonal), they appear to be more "adjusted" in another (cognitive)[1970, p. 4354-55].

The problem appears to be one of interpretation. It may be possible to interpret both adjustment and differentiation as desirable entities. In discussing the common conception of adjustment, Putney and Putney (1964) cogently argued that:

One of the prevailing assumptions which Americans have learned to take for granted is that anxiety is a product of inadequate adjustment. This may be the case, but it is equally likely that anxiety reflects inadequacies in the pattern to which the individual attempts to adjust. The adjusted individual is one who is able to fit readily into the normal patterns of his society, but it cannot be taken for granted that one who is adjusted is psychologically healthy. He can be superbly adjusted to his culture, normal in every respect, and yet not lead a full and satisfying life [pp. 7-8].

Thus, it may be that assessing the "adjustment" of an individual may be less important than assessing his psychological health. Research with the R-S dimension has begun to point to such considerations. For example, Weissman and Ritter (1970) reported that both sensitizers and neutrals
were significantly lower in ego strength (Barron, 1953) than repressors, but there were no significant differences between sensitizers and neutrals. They concluded that "these findings suggest that sensitizers, while critical, impatient, action-oriented, and personally more troubled, also have the capacity for personal integration ... and for more creative potential than previous literature would suggest [p. 859]."

The former, more negative, characteristics are consistent with the previously cited findings relating anxiety and adjustment (see Millimet, 1972), but the pattern of differences in ego strength provides the basis for a new assessment of sensitizers. Weissman and Ritter suggested that "while sensitizers experience more personal turmoil than repressors, are less restrained and engage in less socially desirable behaviors, that they also have certain ego strengths (equal to 'normals') which provide them with the capacity to effect significant and perhaps more creative changes in their relationships with others and in their interpersonal environment [1970, p. 864]."

Consistent with Greaves (1971a, 1972), placing the problem in the framework of Conceptual Systems Theory might provide a context in which these conflicting interpretations might be better understood. In such a context, as already noted, selection of the sample population is of critical concern, as the four system types are not equally represented in the normal population.

Subject selection in most anxiety/differentiation studies
is of the "random" variety, usually selecting undergraduate college students from the freshman and sophomore classes. The Wilkins study chose Ss from two upper-division undergraduate courses using the typical random process. In the Harvey study, however, the Ss were selected, as Greaves suggested, on the basis of conceptual level (10 Ss at each level selected from a larger sample of 150 students). As Greaves pointed out, this difference in sampling alone might account for the conflicting results noted earlier.

Assuming that the population distribution of CL types reported by Harvey (1970) holds true across the colleges used, one would expect that randomly selected samples would lead to an overrepresentation of the lower levels of CL. That is, such samples represent a restricted range of level of conceptual functioning. Consequently, inferences from such studies must be limited, as the systematic sub-group differences in cognitive style are not effectively accounted for.

Consideration of the theoretical relationships among the variables (CL, trait anxiety, and cognitive differentiation) might provide support for Greaves' (1971a) contention that CST may provide a framework for resolving such research problems. System 1 persons are cognitively simple, undifferentiated, concrete, relatively unaware of their environment, quite "adjusted" to the established facets of the society they live in, and are thus relatively free of "anxiety." System 2 persons, dogmatically rejecting societal norms and
seeing little of use or relevance in their interpersonal environment, are only slightly more differentiated, much less "adjusted," and much more anxious, as a result of perceiving many facets of their world as personally threatening. System 3 persons, more highly differentiated, more open to the social environment, focused on interpersonal relations, and highly sensitive to mutual dependencies and interpersonal acceptance, should also experience a high level of anxiety. As Harvey et al. (1961) stated: "The most direct central characteristic of extreme level III functioning is the direct expression of anxiety [p. 319]."

Persons at System 3 represent high levels of differentiation and interpersonal awareness, and yet they have not developed the integrative mechanisms with which to resolve perceived conflicts. Since, as previously suggested, persons with greater differentiation perceive more conflicting (and hence potentially threatening) stimuli, they are more prone to experience anxiety states, and thus should score high on measures of trait anxiety.

Thus, through System 3, theoretical relationships are highly consistent with the reported research results—anxiety and differentiation covary in a positive linear relationship. Furthermore, level of conceptual systems functioning seems to provide a theoretical explanation for this covariance. It is at the highest level of conceptual functioning that theory and research appear to diverge—i.e., the positive linear relationship may change.
System 4 persons, as described earlier, seem to have as their most central characteristic an "integrated personality," in the sense that this term has most recently been used (e.g., Loevinger, 1966; Maslow, 1970, 1971; Rogers, 1961; Seeman, 1959). Harvey et al. (1961) described System 4 persons as being characterized by a "strengthened capacity to face problems and to tolerate anxiety. The initial transition to the fourth stage may produce anxiety and worry ..., but once the conceptual system becomes stabilized, such reactions are much less likely. Therefore, the subject not only develops autonomous skills and informational standards for problem solution, but also a high degree of tolerance of anxiety and resistance to stress [p. 108]." Thus, the incidence of anxiety-proneness should be less among System 4 representatives.

Seeman's (1959) concept of personality integration seems to be similar to the description of System 4 functioning and provides further support for a prediction of low trait anxiety in the integrated personality. Such persons have reported (Hearn & Seeman, 1971) a significantly higher proportion of positive affect states than the normal population, indicating "that the psychologically integrated person sees his environment and the people around him as warm and safe, rather than as dangerous or threatening [p. 142]."

Personal turmoil and troubled states, then, increase with cognitive differentiation through System 3 and into System 4, but as System 4 stabilizes, such problems should become less associated with the integrated personality. In general, one
would expect trait anxiety to be highest in Systems 2 and 3 and lowest in Systems 1 and 4.

To reiterate, the purposes of the present study were (a) to replicate the findings of Harvey, Reich, and Wyer (1968), using a modified version of Bieri's measure of differentiation, and (b) to investigate the interrelationships among conceptual level, cognitive differentiation, and trait anxiety, replicating Wilkins, Epting, and Van De Riet (1972) and testing the expected theoretical relationship of CL to anxiety.

The following hypotheses related to these purposes were tested:

1. Cognitive differentiation increases as a positive function of conceptual level.
2. With regard to amount of cognitive differentiation, the effect due to intensity of regard is greater than the effect due to direction of regard.
3. Trait anxiety varies as a curvilinear function of conceptual level, with both Systems 2 and 3 being significantly higher in anxiety than Systems 1 and 4.
4. Independent of conceptual level, differentiation increases as a positive function of level of trait anxiety.

Method

Subjects.

A sample of 80 Ss was selected from a larger population of approximately 300 college students enrolled in several undergraduate and graduate courses at the University of Nebraska at Omaha. As an initial subsample, approximately
100 Ss were randomly selected on the basis of age, sex, and level of conceptual systems functioning as determined by Harvey's (1966) This-I-Believe (TIB) test (to be described). After testing and matching, a final sample of 80 Ss was constructed so that there were 20 representatives (10 males and 10 females matched as closely as possible for age) from each of the four conceptual systems. All Ss participated in the study on a voluntary basis.

Measures.

Anxiety. Millimet's (1970) MAD scale was used as the measure of trait anxiety. The MAD consists of 63 (form for males) or 59 (form for females) true-false items. Millimet (1970) reported high test-retest reliability (r = .95) and satisfactory construct validity for the MAD. High scores on the MAD are presumed to indicate high-anxious Ss, while low scores indicate low-anxious Ss (trait anxiety).

The state anxiety portion of the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1968) was used to check for possible variations in situational anxiety arousal among the Ss. Reliability and validity data on the STAI have been reported by Spielberger and Gorsuch (1966) and Spielberger et al. (1968).

Cognitive differentiation. This dimension of cognitive structure was measured with Vannoy's (1965) modified version of the grid technique devised by Bieri (1961, 1966; Bieri et al., 1966) to measure "interpersonal cognitive complexity." For this measure, Ss list the name of one person from their social environment to fit each of 10 specified role categories (e.g.,
"mother," "person you like," "boss," etc.). Each of these 10 persons is then rated on 10 bipolar personality constructs (e.g., "outgoing-shy"), using a six-point rating scale written beneath each construct. The rating scale ranges from Left-3 to Right-3, with no zero-point (i.e., L3-2-1-1-2-3R). The rating chosen is intended to be the S's estimate of where the person being rated falls on the construct continuum, e.g., more "outgoing" or more "shy." Among the bipolar constructs, the side on which the more desirable adjective (e.g., "outgoing") appears is counterbalanced.

The score for cognitive complexity is derived by comparing each rating with the one adjacent to it (i.e., for the same person) in the matrix. One point is scored for every pair of identical ratings. Since there are 45 possible row comparisons in the 10 x 10 matrix, 450 is the highest possible score. Such a score would indicate cognitive simplicity, as the S's use of the construct dimensions provides no basis for differentiation among persons in his environment. A person with a low score (e.g., 100) is considered to be relatively cognitively complex, due to his demonstrated greater differentiation among persons in his environment.

The development of Bieri's grid technique was summarized in Bieri (1955, 1961) and Bieri et al. (1966). Vannoy (1965) reported a correlation coefficient of \( r = .64 \) (N=113) between his modified version and Bieri's original measure.

**Conceptual level.** The relative concreteness-abstractness of the Ss' belief systems was measured with Harvey's (1966) TIB test. This test asks the S to write his reactions to the
statement, "This I believe about __________," the blank being filled in successively by one of 10 concept referents, e.g., "the American way of life," "sin," "religion," etc.

The 10 statements are presented, one at a time, in a booklet format, with a two-minute time limit for each response. Subjects may be classified into one of four system types based on the "normativeness, absolutism, evaluativeness, entertainment of alternatives, amount of information and attitudinal direction," along with other criteria as elaborated in numerous reports cited by Harvey et al. (1968). The four conceptual types represent the four principal belief systems or levels of abstractness posited by Harvey et al. (1961). Reliability and validity data on the TIB were reported by Cox (1970), Greaves (1971b), and Harvey (1966).

Responses were scored and system assignments made by two trained judges. An interscorer reliability coefficient of \( r = 0.88 \) was achieved by the two judges on the basis of a randomly selected sub-group \((n=30)\) of the original sample.

**Procedure.**

Approximately 300 Ss were given the TIB in their classrooms in groups ranging from 10 to 150 people at one time. From this sample, an initial-subsampling of approximately 100 Ss were contacted by telephone and asked to participate in a one-hour testing session. Testing was accomplished in groups of 1 to 5 Ss over a period of 3 to 4 weeks. Each S completed, in order, the STAI, the MAD questionnaire, and the cognitive differentiation measure.
After the three tests were completed, the Ss were asked to perform two further rating tasks on the role categories in the differentiation measure. The first rating procedure was required to negate possible ambiguities regarding the affective value of the S's attitude toward each stimulus person. In both Bieri's original measure and Vannoy's modified version, the 10 specified role categories were the same, five being considered more "positive" stimuli and the five others being considered to be more "negative." Wilkins and Epting (1971) factor-analyzed these categories and found two factors which accounted for the largest proportion of the total score variance—one more positive and one more negative. However, the factor loadings of the role categories were not consistent with the usual dichotomy. Wilkins and Epting concluded that such a dichotomy should not be made without a check of their actual affective value.

Accordingly, the assignment of positive, neutral, and negative values to the role categories in the present study was accomplished by having the Ss rate their affective response to each stimulus person as compared to the 9 other persons by rank-ordering the 10 persons from most to least positive. For each S, the top three instances were considered positive, the middle four neutral, and the bottom three negative. As a further check on the actual affective values, the Ss were instructed to place by each instance the appropriate symbol—positive (+), neutral (N), or negative (−)—representing how they felt toward each person they had rated.
Finally, an intensity measure was derived (cf., Harvey et al., 1968) by having Ss rate the intensity of their feeling toward each stimulus person on a 10-point scale, with 10 defined as the "most intense" feeling that one can imagine any person having about anyone or anything else, regardless of whether they were used as stimulus persons in the test and regardless of the affective value of the attitude.

After all testing was completed for all Ss, the matching procedure for CL, age, and sex was applied to form the final sample of 80 Ss, as described previously.

Results

Preliminary analysis. In order to assess variations among Ss in state anxiety, a one-way analysis of variance was performed with the four system types as the independent variable and scores on the state form of the State-Trait Anxiety Inventory (Spielberger et al., 1968) as the dependent variable. Mean state anxiety scores for the four systems are presented in Table II.

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Insert Table II about here
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The analysis found no significant differences between the four systems in state anxiety (F < 1), indicating that variations in situational anxiety arousal were not sufficient to affect results of further analyses.

Differentiation as a function of CL, intensity, and regard. This first analysis was performed to test the predictions of Hypotheses 1 and 2 that (a) cognitive differentia-
tion varies with conceptual level such that concrete Ss demonstrate less differentiation than abstract Ss and (b) across all Ss, cognitive differentiation is a function of intensity of feelings rather than the positive, neutral, or negative regard of the stimuli persons.

In order to replicate as closely as possible the analysis of Harvey, Reich, and Wyer (1968), Ss were divided into concrete (Systems 1 and 2) and abstract (Systems 3 and 4) groups. Using the median intensity score, Ss were divided into high- and low-mean intensity groups. The criterion measure consisted of mean cognitive differentiation scores for each S at the three levels of regard (positive, neutral, and negative). Means and standard deviations of the resulting data are presented in Table III.

These results were tested with a 2 x 2 x 3 analysis of variance for unequal N's with repeated measures on the last factor (regard). The unequal N's resulted from the median split on intensity. Each S's mean intensity score was compared to the median intensity score of all responses to determine placement in high- or low-mean intensity groups. The results of the analysis are summarized in Table IV.

Consistent with the hypothesis that cognitive differentiation varies positively with conceptual level, the main effect of
concreteness-abstractness was statistically significant ($F = 3.25$, $df = 1/75$, $p < .10$), indicating less differentiation by concrete Ss ($\bar{X} = 28.96$) than by abstract Ss ($\bar{X} = 26.80$).

The hypothesis that differentiation is affected more by intensity than by regard was not supported. The main effect for regard was statistically significant ($F = 2.90$, $df = 2/150$, $p < .10$) while the main effect of intensity accounted for only minor variability ($F < 1$). Individual comparisons among the means of the three categories of regard indicated that positive stimuli ($\bar{X} = 8.89$) were differentiated significantly more than neutral ($\bar{X} = 9.45$, $t = 1.88$, $p < .10$) and negative ($\bar{X} = 9.56$, $t = 2.24$, $p < .05$) stimuli.

**Anxiety as a function of CL.** Hypothesis 3 predicted that trait anxiety would vary as a curvilinear function of conceptual level, with persons at Systems 2 and 3 exhibiting higher trait anxiety than persons at Systems 1 and 4. Means and standard deviations of the data for this analysis are summarized in Table V.

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Insert Table V about here
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A one-way analysis of variance was performed to assess variations in trait anxiety as a function of the four conceptual systems. The analysis, including orthogonal polynomials, is summarized in Table VI.

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Insert Table VI about here
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The results showed that trait anxiety varied as a function of system type ($F=2.68$, $df=3/76$, $p < .10$). More specifically, the linear trend was statistically significant ($F=4.39$, $df=1/76$, $p < .05$), the quadratic trend was not, and the cubic trend was also significant ($F=3.61$, $df=1/76$, $p < .10$). These trends are represented graphically in Fig. 1.

As the quadratic trend was not significant, Hypothesis 3 was not supported. The significant linear trend indicated that Systems 1 and 2 (concrete) Ss ($\bar{x}=21.85$) showed greater trait anxiety than Systems 3 and 4 (abstract) Ss ($\bar{x}=14.975$).

Differentiation as a function of trait anxiety. Hypothesis 4 predicted that regardless of conceptual level cognitive differentiation increases as a positive function of trait anxiety, so that persons high in trait anxiety should show more differentiation than persons low in trait anxiety.

In order to replicate the analysis of Wilkins, Epting, and Van De Riet (1972), the 80 Ss were divided into three groups—high (sensitizers), medium (neutrals), and low (repressors) trait anxiety—on the basis of their MAD scores. Males whose MAD scores were above 32 and females whose scores were above 34 were classified as sensitizers ($n=10$), while males below 12 and females below 14 on the MAD were classified as repressors ($n=30$). Subjects whose scores fell between these points were classified as neutrals ($n=40$). Differentiation
means and standard deviations for the three levels of trait anxiety are presented in Table VII.

A one-way analysis of variance was performed with cognitive differentiation as the dependent variable and level of trait anxiety as the independent variable. There were no significant differences among the three groups (F<1).

Discussion

It was expected that cognitive differentiation would increase with conceptual level. This prediction was consistent with Conceptual Systems Theory (CST) as proposed by Harvey, Hunt, and Schroder (1961). It was also expected that intensity would have a greater effect on differentiation than regard. This hypothesis was derived from the results of a study by Harvey, Reich, and Wyer (1968), who found a highly significant intensity effect. They also found a significant regard effect, but their analysis showed that neutral stimuli were differentiated significantly more highly than either positive or negative stimuli, while the differentiation of positive and negative stimuli did not differ. From these results, Harvey et al. concluded "that the direction of attitudes toward stimuli is not an important determinant of ... differentiation [1968, p. 477]" They also cited significant intensity x concreteness-abstractness and intensity x regard interaction effects.

In the present study, significant effects were noted for concreteness-abstractness and regard. Although not significant
in the Harvey et al. study, the concreteness-abstractness effect is consistent with the theoretical predictions of CST (i.e., concrete persons are less differentiated than abstract persons; Harvey, 1966; Harvey et al., 1961) and the hypothesis of the present study. On the other hand, the regard effect was present while the intensity effect was not, a reversal of the predicted relationship in Hypothesis 2.

Both studies (Harvey et al., 1968 and the present study) found a significant effect for regard. However, individual comparisons in the two instances produced different results. Harvey et al. found that neutral stimuli were differentiated significantly better than both positive and negative stimuli, while positive stimuli were differentiated better than both neutral and negative stimuli in the present study. This result seriously contradicts the bulk of research concerning affect and cognitive differentiation. As reported previously, this research has demonstrated that negative stimuli typically elicit more differentiation than positive stimuli. Yet Supnick (1964) demonstrated the opposite effect, that positive stimuli (liked persons) were more easily differentiated than negative stimuli (disliked persons). Irwin, Tripodi, and Bieri (1967) paid little notice to Supnick's results, suggesting that the difference was probably due to the fact that a different measure of cognitive complexity was used. The present study supports Supnick's finding and represents the only reported evidence of positive stimuli eliciting better differentiation on Bieri's measure. This result only serves to further confuse the issue of the effect of regard. The equivocal nature of such research
leads again to consideration of the possible effects of intensity.

In addition to the absence of a significant main effect for intensity in the present study, a closer analysis revealed a further contradiction. An examination of the mean intensity levels of the three categories of regard showed that positive (\(\bar{x}=8.36\)) stimuli were regarded more intensely than both neutral (\(\bar{x}=6.07\)) and negative (\(\bar{x}=4.57\)) stimuli. Assuming that intensity is the relevant variable as argued by Harvey et al., (1968), then the fact that positive stimuli were better differentiated than negative stimuli might be explained by the higher level of intensity for the positive category. However, the results of the Harvey et al. study indicated that differentiation should be better under low- than high-intensity conditions.

These contradictory results were possibly due to several design problems which arose in trying to replicate the rather complex design of Harvey et al., who used an entirely different measure of cognitive differentiation. The measure they used required Ss to choose eight stimuli in each of the three categories of regard. This procedure assured a representative range and an equal number of stimuli within each category of regard. The present study attempted an adaptation of Bieri's measure of cognitive differentiation to the design used by Harvey et al., so that a more direct comparison could be made with research using Bieri's test.

Problems encountered with this adaptation resulted in procedural differences which might preclude an accurate comparison of the results of the present study with those of
Harvey et al. The most important problems involved (a) the method of determining the stimuli in each category of regard and (b) the technique used to elicit intensity ratings.

Previous research with Bieri's measure (e.g., Irwin et al., 1967; Wilkins et al., 1972) had assigned arbitrary designations of affect (regard) to the stimuli (predetermined role categories) and included only positive and negative categories. As noted previously, Wilkins and Epting (1971) reported a study indicating that these arbitrary designations are not accurate representations of the S's feelings. In the present study, two procedures were used to assign regard categories to the stimuli. The first technique was the ranking procedure described in the Method section. A second procedure was to have S indicate his affective response to each stimulus person by placing a (+), (N), or (-) beside each one. This procedure, while providing a more accurate appraisal of each S's affective responses, resulted in a different number of items in each category of regard for every S. Some Ss had no neutral and/or negative ratings at all and thus had to be dropped from any subsequent analysis.

To compare the two procedures, a post hoc analysis of variance was performed on the data from the latter sample (N=55). As in the original analysis, the only significant effects were for concreteness-abstractness (F=6.66, df=1/51, p < .05) and regard (F=3.53, df=2/102, p < .05). These results suggest that the two procedures are comparable for Bieri's measure. The ranking procedure is probably the most desirable
of the two since it allows use of the entire sample in any subsequent analysis.

Compared to the differentiation measure used by Harvey et al., Bieri's test has an important shortcoming. The range of regard is fixed for Bieri's measure, since the role categories are predetermined. In contrast, the Harvey et al. method assures a wider range of stimuli within and across categories of regard.

In addition, since there are fewer stimuli in each category of regard on Bieri's measure, and since all 10 role categories represent significant persons in a S's social environment, the range of intensity scores is also smaller.

A further problem with the ranking procedure may have produced the conflicting results noted previously for the intensity effect. After Ss rank-ordered the stimuli and recorded their specific affective reactions, they were asked to rate the intensity of those reactions. All three ranking and rating tasks were performed on the same form so that the affective and intensity ratings were recorded alongside the 10 rank-ordered stimuli. It is thus possible that the explicit order effect was responsible for the intensity ratings being confounded with the level of regard rankings. The mean intensity scores noted previously for the three categories of regard support this possibility—positive stimuli were highest in intensity, followed by neutral and negative stimuli, in that order. It is also possible that the restricted range of stimuli in Bieri's test affected these intensity levels.
The problems with the intensity ratings may also have precluded a significant concreteness-abstractness x intensity interaction as found by Harvey et al. The hypothesis of the Harvey et al. study was that concrete Ss would demonstrate better differentiation under low-intensity conditions, while abstract Ss would demonstrate better differentiation under high-intensity conditions.

In a recent study, Miller and Harvey (1973) sought confirmation of a similar hypothesized interaction between concreteness-abstractness and state anxiety, using several intellectual and motor tasks as the criterion variables and using only System 1 and System 4 Ss as the concrete and abstract groups. The overall results of their study failed to demonstrate the hypothesized interaction, and they found no main effect for anxiety. Miller and Harvey suggested that their results could most likely be explained by the restricted range of state anxiety scores in their sample. The results of the present study are consistent with their findings, as state anxiety did not vary across conceptual levels. Moreover, differences between individual pairs of systems in state anxiety were least between Systems 1 and 4.

To test Harvey's interaction hypothesis, a second post hoc analysis was performed on the data from the present study, using concreteness-abstractness and low and high trait anxiety (determined by a median split) as the independent variables and cognitive differentiation as the dependent variable in a 2 x 2 analysis of variance. The hypothesized interaction between
concreteness-abstractness and trait anxiety was statistically significant ($F=3.33$, $df=1/81$, $p < .10$), with high-anxious concrete $S$s ($\bar{X}=106.0$) exhibiting less differentiation than low-anxious concrete $S$s ($\bar{X}=92.72$), while high-anxious abstract $S$s ($\bar{X}=87.94$) were more differentiated than low-anxious abstract $S$s ($\bar{X}=92.86$). The main effect for concreteness-abstractness was also significant ($F=5.24$, $df=1/81$, $p < .025$), again supporting Hypothesis 1.

These results provide further support for Harvey's interaction hypothesis. Concrete $S$s who tend to be adversely affected by anxiety arousing situations are more cognitively simple than low-anxious concrete $S$s, while abstract $S$s higher in anxiety-proneness are more differentiated than their low-anxious counterparts.

It is interesting to note that low-anxious concrete and abstract $S$s have almost identical mean differentiation scores, while the two high-anxious groups show the largest difference and thus account for both the interaction effect and the main effect for concreteness-abstractness. This finding may indicate that for abstract $S$s higher trait anxiety maintains a facilitating function, while for concrete $S$s high anxiety maintains a debilitating influence on cognitive complexity. Of course, any causal relationship between trait anxiety and cognitive differentiation cannot be inferred from the results of this study. All of the tests used in the present study purport to measure relatively stable cognitive or attitudinal personality characteristics. Further investigations should
involve the study of these characteristics as predictor variables using behavioral criteria such as performance on intellectual and motor tasks like those used by Miller and Harvey.

Another result of the present study was that the prediction that trait anxiety varies curvilinearly with conceptual level was not supported. Rather, the significant trend was mainly linear, with concrete Ss being higher in trait anxiety than abstract Ss. The hypothesis was primarily extrapolated from theoretical discussions of Conceptual Systems Theory and some empirical results relating trait anxiety to cognitive differentiation. Given the contradictory results, several flaws appear in the logic of the derived hypothesis. One problem involves the definition of trait anxiety. Another problem concerns the use of the TIB as a measure of CL.

In Conceptual Systems Theory (CST), as discussed by Harvey, Hunt, and Schroder, (1961), mention is made of anxiety in relation to the four system types. These discussions logically led to the predictions of a curvilinear function. However, it now appears likely that the experiences termed "anxiety" by CST are probably not the same experiences denoted by Millimet, Spielberger, Taylor, and others when they speak of trait anxiety. Thus, the predictions of this study might have been more accurate had they been more firmly based on a clear understanding of the operational definition of trait anxiety as measured by the MAD scale. It is possible that the predicted relationships do occur between conceptual level,
differentiation, and an experience of anxiety quite different from the trait anxiety measured in this study. It may be that some form of anxiety is associated with abstract, integrated persons, as suggested by Harvey's interaction hypothesis. Indeed, one abstract S (a representative of System 4), while beginning to complete the state anxiety questionnaire, commented, "You may get contradictory answers here. I may put that I feel both calm and tense. I'm calm when I feel taut and tensed-up; then I know that I'm ready to go!" This comment suggests that, for this abstract person, the feeling of tenseness has a facilitating function.

It appears, then, that a useful approach to the problem of the relationships between these variables might be to distinguish at least two types of trait anxiety, one type more facilitating for the person and the other type more debilitating. Such a distinction was made by Alpert and Haber (1960) in their Achievement Anxiety Test (AAT). Watson (1967) reported a correlation of .46 (N=648, p < .01) between the debilitating scale of the AAT and the Taylor Manifest Anxiety Scale (MAS), and a correlation of -.19 (N=648, p < .01) between the MAS and the facilitating scale of the AAT. Using such an interpretation, the MAD could be considered a measure of debilitating anxiety, and scores on it would be expected to decrease as conceptual level increases. Because of the low correlation associated with facilitating anxiety, a measure of this type may be more consistent with the hypothesis originally stated between anxiety and conceptual level.
Another problem relating to the contradictory results concerns a measurement property of the TIB test. The typical scoring procedure places each S into one of four system types or into a "mixed" category. In this study, only representatives of the four "pure" system types were selected for the final sample. The overall mean MAD score for the final sample was 18.41, lower than the usual norm means reported by Millimet. If the original sample can be considered a normal one, then those not tested in the final sample (primarily "mixes") should have higher trait anxiety scores. This possibility suggests that a better research design might be to include a fifth group of 20 Ss—all mixes.

However, the use of mixes also presents difficulties. The problem is that, of all five groups, the mixed group is the most heterogeneous. In scoring the TIB protocols, scorers are instructed to look for "pure" system types by making an overall intuitive judgment of each person's responses. Attention must be paid, however, to major divergences from a consistent representation of one type of response. In such cases, the protocol is assigned a mixed designation, with numbers combined to represent the primary response tendencies. So you may have many different kinds of mixes, e.g., 1-2, 1-4, 2-1, 2-3, 2-4, etc.

All such scores fall into the mixed category. Also, there are certain individuals whose protocols must be assigned this mixed designation, but whose overall responses clearly indicate a person in transition from one conceptual system to the next.
 highest one. Most reported research with the TIB excludes these mixed Ss. This represents a major problem for research with Harvey's measure. Though it would seem reasonable to find some way of including the mixes in future analyses, a more refined scoring procedure needs to be worked out to better differentiate people in that category.

Although not supporting the predictions of the present study, the relationship of trait anxiety to conceptual level reported here with only the four system types appears quite reasonable in light of some related studies. System level on the TIB has been shown to be related to Rotter's (1966) Internal-External (I-E) Locus of Control Scale, with abstract Ss having a more internal locus of control while concrete Ss have a more external one. Watson (1967) reported a positive correlation between the I-E scale and the MAS ($r=.36, N=648, p<.01$), i.e., higher scores on the I-E scale (indicating externality) tend to correspond with higher scores on trait anxiety. Furthermore, dogmatism—a functional aspect of concrete belief systems (Harvey et al., 1961)—has been shown to be positively related to Byrne's R-S scale ($r=.44, N=138, p<.001$) Byrne, Blaylock, & Goldberg, 1966), i.e., dogmatism tends to be associated with sensitization (high trait anxiety). Harvey (1966) reported a negative relationship between Rokeach's (1960) Dogmatism Scale and conceptual level, i.e., System 1 Ss scored highest on dogmatism, followed by Systems 2, 3, and 4. Thus, these studies demonstrate empirical and conceptual linkages corroborating the results of the present study that concrete Ss are more
prone to trait anxiety than abstract Ss.

It had also been predicted that cognitive differentiation would vary positively with level of trait anxiety, so that low scorers should be less differentiated than high scorers. Contrary to this hypothesis and the results of Wilkins et al. (1972), the present study found no differences in the cognitive differentiation of persons at low, medium, and high levels of trait anxiety. The results of Wilkins et al. (1972) and the results of the present study are compared in Fig. 2.

Insert Fig. 2 about here

In addition to the fact that there was no significant change across the three levels in the present study, another striking difference that is readily observable in Fig. 2 is the much lower overall scores on differentiation in this study. Two major differences in the two studies may account for the varying results: (a) different sample populations and (b) different forms of Bieri's test.

The present study considered a carefully selected sample intended to be representative of the range of conceptual complexity, with 40 males and 40 females matched as closely as possible for age. Unfortunately, Wilkins et al. did not report the age or sex of Ss in their sample, stating only that they were "undergraduates enrolled in either child or abnormal psychology courses." It is thus difficult to assess differences between the two samples.
Assuming no major difference in the sample populations, the crucial factor may well have been the use of a modified version of Bieri's test in the present study. More specifically, a possible explanation involves the effects of social desirability on the two tests. As reported, Vannoy's modified version was used in this study to try to reduce the confounding effects of socially desirable response sets on the relationship between cognitive differentiation and trait anxiety scores. Since, as previously noted, repressors score highest in social desirability, one would expect any reduction in such confounding to have the most effect on their scores. As is readily observable in Fig. 2, the greatest difference in the two studies did occur for repressors. Such a difference is logically consistent with Bieri's scoring system, since socially desirable response sets should produce greater agreement among ratings and thus higher total scores, indicating more simplicity. So the removal of social desirability should lower the scores of repressors with little effect on sensitizers. The net result is the disappearance of differences between the two groups.
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FOOTNOTES


## TABLE I

Group Mean Interpersonal Cognitive Complexity Scores for R-S Levels

<table>
<thead>
<tr>
<th>R-S level</th>
<th>Positive role category</th>
<th>Negative role category</th>
<th>Total score</th>
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<tbody>
<tr>
<td>Level 1 (Sensitzers)</td>
<td>68.3</td>
<td>59.2</td>
<td>127.5</td>
</tr>
<tr>
<td>Level 2 (Neutrals)</td>
<td>74.8</td>
<td>63.9</td>
<td>138.7</td>
</tr>
<tr>
<td>Level 3 (Repressors)</td>
<td>89.8</td>
<td>67.1</td>
<td>156.9</td>
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**TABLE II**

Means and Standard Deviations of State Anxiety on the Four Conceptual Levels

<table>
<thead>
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<th>Conceptual Level</th>
<th>State Anxiety</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td><strong>X</strong></td>
<td><strong>SD</strong></td>
<td><strong>n</strong></td>
</tr>
<tr>
<td>1</td>
<td>34.25</td>
<td>8.16</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>37.90</td>
<td>10.59</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>32.30</td>
<td>9.36</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>34.45</td>
<td>8.74</td>
<td>20</td>
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</table>
TABLE III
Means and Standard Deviations of Cognitive Differentiation on Conceptual Level, Intensity, and Regard

<table>
<thead>
<tr>
<th>Conceptual Level</th>
<th>Intensity</th>
<th>Regard</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Positive</td>
<td>Neutral</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>High  9.687</td>
<td>9.833</td>
<td>9.980</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>SD  2.410</td>
<td>3.090</td>
<td>2.737</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n  24</td>
<td>24</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete</td>
<td>Low  8.480</td>
<td>9.813</td>
<td>9.856</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD  1.677</td>
<td>2.520</td>
<td>2.726</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n  16</td>
<td>16</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High  8.325</td>
<td>8.450</td>
<td>8.871</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD  2/070</td>
<td>1.690</td>
<td>1.423</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n  22</td>
<td>22</td>
<td>22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abstract</td>
<td>Low  8.902</td>
<td>9.838</td>
<td>9.548</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SD  1.730</td>
<td>2.801</td>
<td>2.221</td>
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</tr>
<tr>
<td></td>
<td>n  17</td>
<td>17</td>
<td>17</td>
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</tr>
</tbody>
</table>

Note— One abstract S failed to complete the intensity portion of the differentiation task and thus could not be included in this analysis.
TABLE IV

An Analysis of Variance of Cognitive Differentiation Scores for Intensity, Concreteness-Abstractness, and Regard

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>768.73</td>
<td>78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intensity (A)</td>
<td>2.04</td>
<td>1</td>
<td>2.04</td>
<td></td>
</tr>
<tr>
<td>Concreteness-Abstractness (B)</td>
<td>30.74</td>
<td>1</td>
<td>30.74</td>
<td>3.25*</td>
</tr>
<tr>
<td>A x B</td>
<td>26.13</td>
<td>1</td>
<td>26.13</td>
<td>2.76</td>
</tr>
<tr>
<td>Ss within groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(error between)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td>542.57</td>
<td>158</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regard (C)</td>
<td>19.72</td>
<td>2</td>
<td>9.86</td>
<td>2.90*</td>
</tr>
<tr>
<td>A x C</td>
<td>9.55</td>
<td>2</td>
<td>4.77</td>
<td>1.40</td>
</tr>
<tr>
<td>B x C</td>
<td>0.25</td>
<td>2</td>
<td>0.13</td>
<td></td>
</tr>
<tr>
<td>A x B x C</td>
<td>2.48</td>
<td>2</td>
<td>1.24</td>
<td></td>
</tr>
<tr>
<td>C x Ss within groups</td>
<td>510.57</td>
<td>150</td>
<td>3.40</td>
<td></td>
</tr>
<tr>
<td>(error within)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

*p < .10
TABLE V
Means and Standard Deviations for Trait Anxiety on the Four Conceptual Levels

<table>
<thead>
<tr>
<th>Sex</th>
<th>Conceptual Level</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>21.07</td>
<td>18.45</td>
<td>9.08</td>
<td>13.67</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>14.90</td>
<td>11.61</td>
<td>6.33</td>
<td>8.13</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Females</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>18.90</td>
<td>26.30</td>
<td>18.70</td>
<td>16.90</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>11.56</td>
<td>12.23</td>
<td>11.78</td>
<td>10.50</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Combined</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>20.70</td>
<td>23.00</td>
<td>14.20</td>
<td>15.75</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>13.12</td>
<td>12.09</td>
<td>10.29</td>
<td>9.22</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

Note.—Since male and female MAD forms have different numbers of items (63 and 59, respectively), mean MAD scores for males were multiplied by the proportion 59/63 to make them comparable to the female means.
TABLE VI
An Analysis of Variance and Trend Analysis of Trait Anxiety Scores for the Four Conceptual Systems

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>10697.39</td>
<td>79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>1022.23</td>
<td>3</td>
<td>340.75</td>
<td>2.68*</td>
</tr>
<tr>
<td>Linear</td>
<td>559.32</td>
<td>1</td>
<td>559.32</td>
<td>4.39**</td>
</tr>
<tr>
<td>Quadratic</td>
<td>2.81</td>
<td>1</td>
<td>2.81</td>
<td></td>
</tr>
<tr>
<td>Cubic</td>
<td>460.10</td>
<td>1</td>
<td>460.10</td>
<td>3.61*</td>
</tr>
<tr>
<td>Within groups (error)</td>
<td>9675.15</td>
<td>76</td>
<td>127.30</td>
<td></td>
</tr>
</tbody>
</table>

*p < .10

**p < .05
TABLE VII
Means and Standard Deviations of Cognitive Differentiation Scores for Three Levels of Trait Anxiety

<table>
<thead>
<tr>
<th>Trait Anxiety</th>
<th>Cognitive Differentiation</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>SD</td>
<td>n</td>
</tr>
<tr>
<td>Low (Repressors)</td>
<td>92.730</td>
<td>19.67</td>
<td>30</td>
</tr>
<tr>
<td>Medium (Neutrals)</td>
<td>95.075</td>
<td>18.95</td>
<td>40</td>
</tr>
<tr>
<td>High (Sensitizers)</td>
<td>104.500</td>
<td>28.20</td>
<td>10</td>
</tr>
</tbody>
</table>
Fig. 1
Trait Anxiety as a Function of Conceptual Level
Fig. 2

A Comparison of Cognitive Differentiation Scores from Wilkins et al. and the Present Study as a Function of Trait Anxiety