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Conceptual systems theory and cognitive complexity

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CONCEPTUAL SYSTEMS THEORY AND COGNITIVE COMPLEXITY

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Abstract

The major function of this study was to assess differences in interpersonal cognitive complexity among the four belief systems specified by Harvey's Conceptual Systems Theory. In addition, criticism is offered of many of the more commonly used indicators of cognitive complexity (e.g. Bieri, 1955) since they tend to identify cognitive complexity with cognitive differentiation. Herein is offered an alternative method of measuring cognitive complexity which is seen as indicating both differentiation and integration. The study used 54 graduate and undergraduate students, of which 35 were females and 19 were males. The alternative method of calculating cognitive complexity relies upon Hinkle's (1965) "laddering" technique. A set of constructs was initially elicited from each subject using Kelly's standard Rep grid. Out of these constructs one of the subordinate constructs, as estimated by means of Hinkle's "implication grid," was used as the base from which a series of other constructs were sequentially elicited, with each successive construct being superordinate to that which proceded it. In the context of the pyramidally-shaped theoretical model of cognitive structure herein presented, it is proposed that the number of constructs which can be strung together in such a subordinate-superordinate chain represents the number of hierarchical levels within the cognitive structure and it is this number of hierarchical levels which is proposed as a more accurate approximator of cognitive complexity. Findings revealed, in fact, that there was a negative correlation between a differentiation analysis of complexity and the laddering analysis, suggesting that traditional differentiation scores not only fail to take integration into account, but, in fact, misrepresent integration as a lack of cogntivie differentiation. With regard to the

major hypothesis, neither differentiation scores nor laddering scores discriminated among any of Harvey's four conceptual systems, indicating that Conceptual Systems Theory draws primarily qualitative, rather than quantitative, distinctions among construct dimensions used by the four system types.

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Conceptual Systems Theory (CST) was posited by Harvey, Hunt, and Schroder (1961) as a theoretical proposition identifying four relatively independent belief systems into which individuals could be classified. As originally set forth, CST proposed that the four belief systems be viewed in developmental terms, thereby implying sequential invariance. Identified as Systems 1, 2, 3, and 4, the first three systems were considered to be "arrested stages" composed of individuals who fail to develop optimally due to inadequate developmental conditions. Harvey characterizes a "belief system" in the following manner:

> A "belief system" represents a broad constellation of predispositions to perceive, feel affectively and respond toward ego-involving stimuli, persons and situations. Each system thus should be viewed as being multi-dimensional, possessing in some cases certain attributes shared by other systems. However, the constellation or configuration or gestalt different for each system renders psychologically different what, out of such context, would otherwise appear to be similar attributes in some cases. Thinking in terms of a factor analytic model or some superordinate construct, a system should be viewed as a high-order factor or construct. (Harvey, note 1, p. 10)

The cognitive dimension conceived to be primary in distinguishing between these four belief systems was that of "concreteness--abstractness," referring to the manner in which the subject differentiated and integrated his environment. Concreteness was identified with less differentiation and integration, greater reliance upon conventional attitudes, traditions and authority, greater rigidity, greater intolerance of ambiguity, greater need for cognitive consistency, and greater tendencies toward absolute (good--bad) evaluations. Greater abstractness, on the other hand, was seen to correspond with a greater ability to generate multiple interpretations and a lesser propensity toward rigid stimulus-response connectedness. In addition, cognitive abstractness was seen as highly related to a tendency toward greater relativism with respect to both an individual's thoughts and behaviors.

The four primary belief systems are clearly distinguishable in a number of ways, among which is the fact that System 1 individuals are characterized by both the "*a priority* assumption" -- that all objects and events are controlled by some omnipotent authority -- and the assumption that "truth" and "reality" exist externally and independently of the perceiver. As a result, such individuals rely heavily upon traditions, normative standards, authority figures, and societal laws as their guidelines for action. Among such persons one finds a high degree of religious fundamentalism, relatively high ethnocentrism, and an overall high need for structure. They have very strong tendencies to make absolute evaluations into such dichotomous categories as "good or bad," with very little tendency to recognize any gradations between the poles.

The System 2 individual is best characterized as a "rebel" who steadfastly rejects the external referents of System 1 persons but who does not have any stable, clearly defined referents of his own on which to rely. While generally accepting the idea of absolute truth, he rejects those institutional embodiments of such a truth upon which System 1 persons rely so heavily. System 2 persons seem to exist in a psychological void, and are best characterized by a high sense of anomie, considerable cynicism, and very low self-esteem (Harvey, 1967).

System 3 individuals represent increased abstractness due to their ability to comprehend various points of view, although their understanding tends to be characterized by a certain air of superficiality or shallowness in that such persons rarely express strong commitment along any particular line of belief. Their central concern is for personal acceptance and approval by others, but at the same time they tend to foster dependencies in others upon themselves.

> Their need to have others dependent upon them and to administer nurturance to others seems to be directed most toward individuals of low status and low power, possibly because such individuals are perceived by System 3 persons as being more helpless and consequently more receptive to their overtures toward helping. The manifest and latent distinction often made in personality theory is also appropriate to System 3 functioning. At the manifest level, System 3 persons espouse the cause of the more helpless, proclaim the importance of love and universal human concern, and express a high desire to help mankind in general. At the more latent level, System 3 individuals at the same time are asking that they be the focus of potential help. (Harvey, note 1, p. 14)

System 4 persons are viewed as the most differentiated and the most integrated of the four systems, and they are best characterized by a balanced need for both mutuality and autonomy. They tend to rank high in terms of both creativity and tolerance of stress. Whereas Systems 1 and 2 persons tend to validate their conceptions in terms of a priority and System 3 individuals rely upon concensus, System 4 persons tend to be pluralistic in their search for explanatory principles, recognizing the contributions of both situational and personality factors in their assessments of events.

The instrument used by Harvey to classify individuals into conceptual systems is the "This I Believe" (TIB) test. Of several thousand college students to whom he administered this test, Harvey (note 1) has reported that approximately 35% were classified as System 1, 15% as System 2, 20% as System 3, and 7% as System 4. In addition to the four primary systems, the original theory also recognized certain admixtures of systems, and the remaining 23% of students were found to be such combinations of two or more systems. However, both Harvey's own research and that of his colleagues indicate considerable changes in these percentages have occurred over the past decade, with the major changes being a decrease in System 2 individuals and an increase in admixtures (Harvey, note 2). In addition, although as yet unpublished, Harvey has altered his beliefs with respect to the sequentiality of the four belief systems. Harvey now believes that these systems represent four prominent and "relatively" permanent coping strategies for dealing with one's environment. Harvey presently speculates that it is likely that one passes through sequential stages somewhat analogous to the four belief systems (increasing differentiation and integration, increasing evaluative relativism, etc.) within "each" of the belief systems (Harvey, note 2).

In addition to CST, another means of investigating the manner in which one deals with his/her environment is with reference to the individual's interpersonal cognitive complexity, a field of exploration launched by Jones (1954) and followed up by Bieri (1955) and others (e.g., Tripodi & Bieri, 1963; Jaspars, 1963; Bieri, Atkins, Briar, Leamon, & Tripodi, 1966), [Leitner, Landfield, & Barr, note 3]. This field derives from Kelly's (1955) theory of personal constructs, wherein a man's central characteristics are identified as his propensity for increased accuracy of prediction in the area of interpersonal relationships. According to Bieri, the accuracy of one's predictions is largely determined by the degree of differentiation associated with one's construct system.

> Inasmuch as constructs represent differential perceptions or discriminations of the environment, it would be expected that the greater the degree of differentiation among the constructs, the greater will be the predictive power of the individual. In other words, there should be a positive relationship between how well an individual's system of constructs differentiates people in the environment and how well the individual can predict the behavior of these people... A system of constructs which differentiates highly among persons is considered to be cognitively complex. A construct system which provides poor differentiation among persons is considered to be cognitively simple in structure. (Bieri, 1955, p. 263)

The area of cognitive complexity has been explored primarily through the use of Kelly's (1955) Role Construct Repertory (Rep) technique. An in depth review of the use of the Rep technique can be found in Bannister and Mair (1968), and a review of the use of this technique in the investigation of cognitive complexity can be found in Leitner, Landfield, and Barr (note 3). Briefly, the Rep technique has subjects consider various triads of persons with whom they are familiar, and for each triad the subject is asked to generate what Kelly refers to as a bipolar "construct" stating the way in which two of the individuals are alike and different from the third person. For example, in viewing a particular triad the subject may generate the construct dimension "loving-cruel", indicating that the subject perceives two of the persons as similar, in that they are "loving," and the third person as dissimilar, in that he/she is perceived as being "cruel." In the assessment of cognitive complexity subjects are usually requested to generate 10 to 15 personal constructs, each of which is seen as a dimension used by that subject in the interpretation of his/her interpersonal environment. Kelly (1955) found that when subjects were asked to generate as many bipolar dimensions as they could, forty constructs was found to be about the maximum number produced. When the constructs have been generated, subjects are asked to rate "all" of the persons used in the various triads on each of the construct dimensions which were generated, and although various techniques have been used to arrive at an estimate of cognitive complexity (Leitner, Landfield, & Barr, note 3), each estimate considers the differences with respect to the ratings of the various constructs across the set of persons. Results of such techniques have produced a variety of indicators of cognitive complexity, all of which purport to represent the number of separate construct dimensions used by a subject in the interpretation of his/her environment.

A major criticism of Bieri (1955) and other investigators (Tripodi & Bieri, 1963; Jaspars, note 7) with respect to their evaluation of cognitive complexity is that they fail to deal adequately with that process so often associated with differentiation, namely, the process of "integration." The debate as to the independence or interdependence of these two processes has been widespread (Schroder & Suedfeld, 1971; Schroder, Driver, & Streufert, 1976; Harvey, Hunt, & Schroder, 1961; Vannoy, 1965). Werner's comparative organismic theory of development (1957) posits a necessary interdependence of these two processes in stressing the dialectical nature of development.

> Each stage of organization is simultaneously directed toward maintaining continuity or stability and generating discontinuity or transformation. The fundamental thesis is that evolution is a synthetic process that interweaves two antithetical organismic tendencies: to maintain continuity in order to conserve one's integrity (survival and organizational coherence) and to elaborate discontinuity in order to develop. (Langer, 1970, p. 734)

Werner, therefore, applied the principle of orthogenesis to psychological development, viewing such growth in terms of the complementary processes of differentiation, aimed at elaboration of the system, and integration, aimed at the maintenance of the organism's integrity. He identified stages of mental development as syntheses of these two antithetical processes.

Harvey (1966) has contended that flexibility and adaptability in any system is enhanced with increases in differentiation and integration within that system, and Conceptual Systems Theory clearly suggests that significant differences in flexibility and adaptability do exist across the four conceptual systems. Both Campbell (1960) and Brennan (note 4) have reported linear increases in complexity across the four conceptual systems, with System 4 individuals emerging as highest in cognitive complexity. However, Brennan reported a correlation coefficient of only +.21 between scores generated by the Harvey TIB technique and those from the Tripodi and Bieri (1963) differentiation technique. Streufert and Fromkin (1972) have likewise reported low correlations between TIB scores and Bieri's modified Rep technique analysis of differentiation, and Harvey, Reich, and Wyer (1968) found no significant differences in differentiation scores between concrete (Systems 1 & 2 combined) and abstract (Systems 3 & 4 combined) subjects. Furthermore, Harvey, Wyer, and Hautaluoma (1963, note 8) reported no significant differences for either differentiation or integration across conceptual systems, although they did find that System 4 individuals were significantly better differentiators than were System 1 individuals.

These findings would appear to cast doubt upon Harvey's assumption (1966) that there exist significant differences between conceptual systems on measures of flexibility and adaptability if, indeed, these qualities are highly correlated with differentiation and integration within the cognitive structure. Thomas and Seeman's (1972) review of research relating cognitive complexity to personal adjustment does, in fact, lend support to speculations that flexibility and adaptability are correlated with cognitive complexity.

> Jones (1954, 1961) found that neuropsychiatric subjects had simpler cognitive structures than normal subjects. . . Lundy (1952, 1956) and Bannister (personal communication, November 5, 1967) found that as a person was exposed to a therapeutic relationship his cognitive structures become more differentiated. Complex individuals make higher scores on measures of social

intelligence (Sechrest & Jackson, 1961), are more able to assume social roles (Harvey, 1962; Harvey & Kline, 1965; Wolfe, 1963), and are judged to be better psychotherapists (Gottesman, 1962). [Thomas & Seeman, 1972]

If such findings are accepted as evidence of a positive correlation between personal adjustment, in terms of flexibility and adaptability, and cognitive complexity, then the lack of evidence showing significant differences in cognitive complexity across Harvey's four conceptual systems could be interpreted as evidence that Conceptual Systems Theory does not discriminate between persons on the basis of adaptability and flexibility.

Schroder, Driver, and Streufert (1967) hypothesize that cognitive constructs are arranged such that they can be viewed as a series of hierarchical levels which successively contain fewer elements as the apex is approached. It is assumed that constructs residing at the same hierarchical level are uncorrelated; however, when considering more than one hierarchical level, constructs residing at different levels possess the potential for some degree of correlation, depending upon the hierarchical bonding within the particular cognitive structure. The implications of such a theoretical model call into question the validity of certain techniques of assessing cognitive differentiation (e.g., Bieri, 1955; Bieri, Atkins, Briar, Leamon, & Tripodi, 1966; Tripodi & Bieri, 1963) in that such methods of assessment fail to take into consideration differences in the hierarchical level of those constructs being analyzed. The hierarchical relationships between constructs represent cognitive integration, which is an essential aspect of cognitive complexity overlooked by most existing research methodologies (e.g., Bieri, et al., 1966).

Crockett (1965) has researched the area of cognitive complexity taking into consideration both the process of differentiation and that of integration. Crockett (1965) defines differentiation in terms of the number of independent constructs used by an individual, whereas he characterizes integration in terms of both, "the complexity of the relationships among constructs, and the degree to which clusters of constructs are related by superordinate, integrating constructs" (Crockett, 1965, p. 50). Furthermore, Crockett found some evidence indicating that, "subjects who show a highly complex system with respect to one domain of events will also show high complexity with respect to other domains" (Crockett, 1965, p. 62). This finding lends credence to theoretical speculation that cognitive "structure," rather than simply learned content, is basic to cognitive complexity.

The present study, in exploring the relationship between conceptual systems theory and cognitive complexity, adopts a model of cognitive structure which conforms to Bannister's conception of the structure of construct systems as stated below:

> This pyramidal structure of construct systems seems to serve a variety of purposes in science and in living. For example, if we accept that the more superordinate constructs will have more implications and a wider range of convenience than their subordinate constructs, then 'climbing up our system' may be a way of finding strategies for cross-referencing more subordinate constructions which cannot be directly related to each other 'across' the system. Thus the old adage that you can't add 'horses' and 'cows' is nonsense as soon as you climb up the subsystem and subsume them both as 'farm animals' and you can blithely add in 'hermit crabs' if you are

prepared to climb up as far as 'forms of organic life.' Equally, you may use the hierarchy as a conflict-resolving process by making decisions in terms of the most superordinate, relevant construct. For example, for some of us 'courteous-discourteous' may be a subordinate construct to 'kind-unkind', and if this be so we may, in exceptional circumstances, decide to be 'discourteous' if we feel that in the long run this is the 'kindest' way to be (say in curtailing a mutually disastrous relationship). [Bannister, 1970, p. 57]

The present model, therefore, conceives of cognitive structure as being pyramidal in shape, with those constructs lying closest to the apex of the pyramidal structure being the more superordinate constructs within the system. Cognitive structure may be viewed as a series of hierarchical levels wherein those constructs at any one particular level are, by definition, independent from other constructs at the same hierarchical level. Although perhaps best represented in three-dimensional form, Figure 1 presents this concept in two-dimensional form for the sake of simplicity. All connections between constructs in this model occur between hierarchical levels rather than within a particular hierarchical level. It should be noted that within this

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Insert Figure 1 about here

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model there is the possibility for relationships between constructs of nonadjacent levels, although only three such connections (represented as dotted lines) are demonstrated in the present model. Furthermore, the actual number of hierarchical levels are hypothesized to vary a great deal among subjects, and it is this number of levels which will be explored as one of the possible indicators of cognitive complexity.

Hinkle (1965) introduced two very promising methods of exploring the hierarchical relationships between constructs in the form of an "implication grid" and a "laddering procedure," and he thereby introduced into grid methodology the means whereby integration could be considered along with differentiation so as to afford a more complete picture of cognitive structure. The implication grid technique involves the comparison of each construct with every other so as to allow assessment of the superordinate-subordinate relationships within a particular set of constructs. The laddering procedure is a technique whereby the experimenter elicits a series of constructs, starting from a position of subordinancy within the cognitive system and moving in a stepwise fashion up through the hierarchical structure until the subject reaches that point which is presumed to be the apex of his/her cognitive structure. Hinkle (1965) devised this technique to explore the hierarchical relationships between construct dimensions within the individual's cognitive structure, and the result of this process is the delineation of a pathway of successive superordinate implications.

The present study utilized the laddering technique by starting the process at what was determined by use of the implication grid to be a relatively subordinate position within the individual's cognitive structure. Constructs of progressively increasing superordinancy were then elicited until the subjects could produce no further superordinate constructs. The number of new constructs produced was seen to represent the number of hierarchical levels within the individual's cognitive structure, and this number of hierarchical levels was then used as an indicator of cognitive complexity. The assumption made, herein, to justify the use of this measure as an indicator of cognitive complexity involves the theoretical speculation that whereas differentiation along a particular hierarchical level is inherently limited by a lack of integrative links, as demonstrated in Figure 1, differentiation with respect to hierarchical level represents the number of units of height of the pyramidal cognitive structure. Each level has a separate differentiation potential and is integratively linked to other levels. Werner's theory (Carmichael, 1970) purports that cognitive complexity can only proceed so long as the organism's integrity is maintained, and such maintenance is a function of integrative links which, in the model just presented, necessarily involves separate hierarchical levels. Comparing this measure with most of the differentiation analyses of the Rep technique which have been used to estimate cognitive complexity (Bannister & Mair, 1968), one finds that with the differentiation techniques one is measuring the number of independent constructs, with such independence being the result of separate constructs having few or no perceptible links existing between them for that particular subject. On the other hand, consider the constructs 'considerate' and 'kind.' It may be hypothesized that for some persons these two concepts are relatively synonymous, such that whenever such a person perceives either one of these two qualities, the other quality automatically becomes a part of that perception. Thus, if one perceives the quality of 'considerateness' in another, he/she also necessarily perceives that other person as being 'kind,' since for such an individual these two qualities are not differentiated from one another.

A further aspect of complexity with which the differentiation measure appears to be unable to deal is whether or not an individual actually perceives two such constructs as simply synonomous terms, or whether the individual does, in fact, discriminate between the two terms even though he/she tends to see them as covarying with one another. This latter case clearly represents greater discriminability than does the former, yet the differentiation analysis may fail to discriminate between these two cases. Keeping mind the cognitive structure model which has been proposed, one can see that cognitive complexity, as measured by differentiation, increases in proportion to the extent to which the subject originally generated either constructs horizontally positioned with respect to one another (at the same heirarchical level) or constructs from different hierarchical levels but with no superordinate-subordinate relationship existing between the two constructs for that particular subject. The danger with relying upon such an analysis is that if a subject chooses a number of separate constructs which are hierarchically related to one another, the subject's cognitive complexity may appear lower than it should due to the lack of sensitivity of the measuring instrument being used.

In the present study, methods other than differentiation are explored as possible indicators of cognitive complexity. Based upon the cognitive model presented, "hierarchical differentiation" or "integrated differentiation" would appear to be a feasible and perhaps preferable alternative to the differentiation analysis of the Rep technique (e.g., Bieri, 1955; Tripodi & Bieri, 1963) since hierarchical differentiation involves both differentiation and integration, these being the two components of cognitive complexity identified by Crockett (1965). Whereas one's differentiation score is based upon the number of constructs generated which do no imply one another, and therefore are not identified as identical in content, one's laddering score is based upon the number of constructs which one can generate while continually moving in the direction of increasing superordinancy. Rather than sampling a random set of interpersonal constructs and analyzing them in terms of their degree of independence from one another, with no controls over the superordinate-subordinate relationships among those constructs, the laddering technique attempts to measure the number of hierarchical levels within one's cognitive structure by attempting to tap a series of constructs wherein each construct is from a different hierarchical level and has implications with respect to at least two other constructs in the series (i.e., one superordinate implication and one subordinate implication). The primary advantage of the laddering procedure would appear to be that all subjects are operating under the same ground rules in their selection of constructs, whereas with the differentiation analysis of the Rep technique subjects are free to choose from any number of hierarchical levels, such that a person who chooses from a single level would necessarily appear to be quite differentiated whereas one who chooses from a series of levels has a greater chance of selecting constructs related by superordinate-subordinate implications. In a differentiation analysis of a set of constructs, the greater the number of superordinate-subordinate implications, the greater the likelihood is of those constructs being analyzed as undifferentiated from one another. It is suggested, therefore, that "differentiation" (Bieri, 1963; et al.) and "integrated differentiation" (as measured by the aforementioned laddering technique) have different referents with regard to cognitive structure. Since "integrated differentiation" takes into consideration "integration" in addition to "differentiation," it is hypothesized that a non-significant Spearman Rho correlation will be found to exist between differentiation scores and laddering scores.

The "integrated differentiation" measure will be further examined by dividing laddering scores into a high, medium, and low group, such that four additional measures can be tested as to their potential usefulness as differentiators among the three group of laddering scores. These measures, derived from the Implication Grid and referred to by Crockett and Meisel (1974) as "degree of connectedness" indicators, are determined by the number of times the various constructs within the cognitive system imply the presence or absence of other constructs within the system. These degree of connectedness scores will be of two primary types, namely, those that disregard reciprocal implications and those that include reciprocal implications in their computation. A further division within each of these two major categories will consist of separate connectedness scores computed first for constructs generated by the Rep technique, and, secondly, for constructs generated by the laddering technique. Thus, the four connectedness scores examined are as follows: Rep connectedness with reciprocals (RepconWR), Rep connectedness with no reciprocals (RepconNR), Laddering connectedness with reciprocals (LadconWR), and Laddering connectedness with no reciprocals (LadconNR). Crockett and Meisel (1974), in their use of the "degree of connectedness," did not discount reciprocal implications, and according to the cognitive model presented herein, one could anticipate that there would be a negative correlation between RepconWR scores and differentiation scores if, in fact, a significant proportion of the implications were reciprocal. Such an hypothesis is based upon the fact that within the context of the present model reciprocal implications are interpreted as demonstrating a lack of differentiation between those constructs being compared since the constructs demonstrate no superordinate-subordinate relationship to one another. Rather, such reciprocal implications imply synonomous relationships between constructs of the same hierarchical level. On the other hand, RepconNR scores are hypothesized to have a positive correlation with differentiation scores since the ability to perceive quantitative differences in the degree of implication of the two constructs indicates both ability to discern between those constructs and the fact that the relationship between those constructs is one of superordinancy-subordinancy. It is anticipated, however, that this correlation will not exceed the + .2 to + .3 range since differentiation scores tend to misrepresent superordinate-subordinate relationships, viewing them as indicative of a synonomous relationship between constructs rather than as differentiated constructs. Since differentiation scores are derived from comparisons of the ratings of the various constructs across role categories, there is no direct comparison of constructs in the differentiation analysis. It is due to this factor that RepconNR analyses are predicted to be only moderately correlated with the differentiation analyses. Whereas a differentiation analysis fails to discriminate between covariation of construct ratings based upon synonomous relationships and covariation based upon superordinate-subordinate relationships, RepconNR scores do distinguish between these forms of construct relationships.

With regard to the usefulness of the "degree of connectedness" indicators as differentiators of low, medium, and high laddering scores, it is anticipated that RepconNR scores, LadconNR scores, and LadconWR scores will all differentiate among subjects of high, medium and low laddering complexity. It is theorized that LadconNR scores and LadconWR scores will not be significantly different from one another since both of these connectedness scores are derived from constructs which were drawn from different hierarchical levels. Therefore, very few, if any, reciprocal implications are anticipated to emerge in the computation of the LadconWR scores, and as such, RepconNR scores, LadconNR scores, and LadconWR scores are all predicted to accurately reflect the relative degree of connectedness (non-reciprocal implications) of the subjects' cognitive structures. These three scores are thus theorized to represent hierarchical integration within cognitive structure, and are therefore anticipated to differentiate among the low, medium and high laddering scores which are also theorized to reflect the relative degree of hierarchical integration. It is also expected that RepconWR scores will discriminate between the high and low laddering complexity groups, however, in this case the high RepconWR scores, indicating a lack of hierarchical differentiation, are predicted to be associated with the low laddering group, whereas the low RepconWR scores are predicted to be associated with the high laddering group.

The final part of this study will consider the relationship between cognitive complexity and Conceptual Systems Theory. This will be done be viewing each of five potential cognitive complexity indicators (i.e., differentiation scores, laddering scores, RepconWR scores, RepconNR scores, and LadconWR scores) as potential discriminators of Harvey's four conceptual systems, analyzed by means of five one-way analyses of variance. Based upon previous findings (i.e., Streufert & Fromkin, 1972; Harvey, Reich, & Wyer, 1968; Harvey, Wyer, & Hautaluoma, 1963; Brennan, 1973) and upon Harvey's personal speculations (Harvey, note 3) concerning the existence of stages within conceptual systems, it is anticipated that there will be no significant differences found with respect to cognitive complexity, as measured by any of these techniques, across the four conceptual systems posed by Harvey, et al. (1961).

The following hypothesis are therefore proposed:

1. No significant correlation will be found to exist between differentiation scores based upon the Rep technique and hierarchical differentiation scores determined by the laddering technique. This is based upon the supposition that the laddering technique estimates the number of hierarchical levels in the cognitive structure, indicating <u>both</u> differentiation and integration according to the cognitive structure model presented herein. This is in contradistinction to the Rep technique based differentiation scores which indicate the extent to which individuals apply constructs differentially across a set of significant others, thereby ignoring the important factor of integration. It is

this difference which gives rise to the hypothesis that a non-significant Spearman Rho correlation will be found to exist between differentiation scores and laddering scores.

2. Two of the connectedness scores will be compared with differentiation scores using Pearson product-moment correlation coefficients, with the expectation that RepconWR scores will be negatively correlated with differentiation scores and that RepconNR scores will be positively correlated with differentiation scores. This prediction is derived from the cognitive model herein presented which suggests that reciprocal implications are indicative of a lack of differentiation between constructs. The correlation between RepconNR scores and differentiation scores, however, is not expected to exceed the + .2 to + .3 range since differentiation scores fail to discriminate between synonomous relationships and superordinate-subordinate relationships between constructs.

3. A series of one-way analyses of variance will determine which of four dependent variables will discriminate between subjects who have been separated into groups of high, medium, and low laddering complexity. The four dependent variables tested are the four connectedness scores. RepconNR scores, LadconNR scores, and LadconWR scores are all expected to discriminate among the three laddering groups, and these predictions are all based upon the premise that the number of hierarchical steps (laddering score) is indicative of the overall cognitive complexity, and that the higher the cognitive complexity (high laddering score), the higher the degree of connectedness (hierarchical integration). RepconWR scores are also predicted to

differentiate between the high and low laddering complexity groups, although in this case an inverse relationship is hypothesized.

4. Five one-way analyses of variance will be performed to test the feasibility of using differentiation scores, laddering scores, RepconWR scores, RepconNR scores, and LadconWR scores as possible differentiators among Harvey's four conceptual systems. It is predicted that none of these postulated cognitive complexity indicators will adequately differentiate among belief systems due to the hypothesis that these systems, rather than being sequential with respect to cognitive complexity, each contains subjects ranging across the cognitive complexity spectrum.

Method

Subjects

Fifty-four graduate and undergraduate students from the University of Nebraska at Omaha served as subjects, of which 35 were females and 19 were males. This sample consisted of 17 System 1 individuals, 11 from System 2, 11 from System 3, and 15 from System 4, and the great majority of these persons received extra credit for their participation. These 54 subjects were chosen as the best representatives of their respective conceptual systems from among approximately 150 subjects who were initially administered the "This I Believe Test."

Procedure

Assessment of Conceptual Systems

Conceptual level was established by relying on the "This I Believe Test" (TIB), an instrument devised by Harvey (1963) which has been shown to have a test-retest reliability over a nine week period of .94 (Greaves, 1971) and an interjudge reliability of .90 when trained judges are used. (Harvey, 1966) This test asked that the subject indicate his beliefs with respect to 10 concepts assumed to be relevant to him, and in each case the particular referent was indicated by the phrase, "This I believe about _________," with the blank filled by one of the following referents: the American way of life, religion, people, marriage, friendship, sin, rules, revenge, lying, and calling a teacher by his/her first name. The test was presented to the subjects in the form of a booklet with the phrase inclusive of one of the referents at the top of each page. The cover to this booklet included the following instructions:

> On the following pages you will be asked to write your opinions or beliefs about several topics. Please write at least two (2) sentences about each topic. You will be timed on each topic at a pace that will make it necessary for you to work rapidly.
> Be sure to write what you genuinely believe.
> You must write on the topics in the order of their appearance.
> Wait to turn each page until the experimenter gives you the signal.
> Once you have turned the page, do not turn back to it.
> PLEASE DO NOT OPEN THIS BOOKLET UNTIL YOU ARE INSTRUCTED TO BEGIN. (Harvey, note 1, pg. 22).

The timing for these ten referents varied, with the first five being allotted 2 minutes each and the second five given 1 minute and 45 seconds each. This cut in time for the second five referents was introduced so as to meet Harvey's recommendation that pressure be kept on the individual in order to maximize an indication of the belief.

The classification of these TIB tests into conceptual systems was based on Harvey's scoring instructions (Harvey, note 1), and the criteria for selection of a subject as representative of a particular conceptual system was initially based upon the agreement of five out of six judges. Expediency required that criteria for selection be altered after approximately one half of the subjects had been selected, with the altered standards being the unanimous agreement of three judges. The scoring process is based upon an overall rating of the booklet in its entirety rather than an additive approach which considers the response to each referent separately.

Assessment of Interpersonal Cognitive Complexity

Role Construct Repertory Technique. This procedure for investigating an individual's construct system was devised by Kelly (1955) and relied upon by Bieri (1955) in his attempt to measure cognitive complexity with respect to one's interpersonal environment. A detailed review of Role Construct Repertory (REP) technique has been developed by Bannister and Mair (1968). In the present experiment the subject was presented with a 10 x 15 grid (Appendix 1) and asked to fill in the ten spaces across the top with individuals from his/her social environment who fit the particular role categories provided. These role categories consisted of the following: (1) Mother or person who is most like a mother to you; (2) Father or person who is most like a father to you; (3) Brother nearest your age or, if you do not have a brother, then the person who is most like a brother to you; (4) Sister nearest your age or, if you do not have a sister, then the person who is most like a sister to you; (5) Husband or wife or, if you are not married, a close friend of the opposite sex; (6) Close friend of the same sex as yourself; (7) Person you dislike; (8) Person who seems to dislike you; (9) Person who makes you feel uncomfortable; (10) Boss or person who holds a position of authority over you. Each of the fifteen rows of the grid had three different role categories marked, and the subject was asked to successively consider each row of the grid and determine some personality characteristic on which two of the individuals were similar and different from the third. In order that all subjects operate within the same general parameters, they were instructed to avoid physical descriptions. In the course of generating the adjective dimensions the subjects were monitored and informed of those constructs which were unsatisfactory and necessitated alteration (e.g., male-female, from one location-from a different location). After generating the fifteen construct dimensions, subjects were asked to rate each of the ten individuals (role categories) on each of the fifteen dimensions. These ratings were based upon a 7-point Likert-type scale, with one through three indicating degrees along the similarity pole of the dimension, four being neutral or indicating that the dimension does not apply to the individual, and five through seven indicating degrees along the contrast pole of dimension. These ratings were placed in the grid box corresponding to the particular individual--construct dimension comparison being considered. Finally, subjects were asked to make a forced choice with respect to pole preference for each of the fifteen adjective dimensions.

This Rep grid was analyzed using a modified form of Bieri's (1955) technique, devised by Millimet (note 5), so as to arrive at a measure of differentiation. This procedure has been described by Millimet and Brien (note 6) as follows:

> The scoring procedure...consists of subtracting the 10 ratings associated with one construct dimension from the corresponding 10 ratings of a second construct dimension. The 10 difference scores, including sign, are compared to each other so that all possible pairings (45) are considered. One point is scored for each pair of differences which are identical in sign and value. This procedure is performed for each of the 105 pairings of the 15 construct dimensions and summed to derive a total construct differentiation score which can range from 0 to 4725. The lower the total score, the greater the differentiation in one's personal construct system. A minor modification in scoring is required to facilitate the analysis for some instances where a negative relationship exists between the construct dimensions. (Millimet & Brien, note 6, pg. 6)

Implication Grid Technique. This procedure was devised by Hinkle (1965) to make pairwise comparisons between constructs within a grid framework, thereby yielding "a schematic representation (in matrix form) of the superordinate and subordinate implications that interrelate a set of constructs." (Bannister & Mair, 1968, p. 88). Subjects were presented with a 25 x 25 grid, on which the preferred pole of those constructs generated in the REP test were listed in the same order both down the side of the grid as well as across the top of the grid. Those listed did not include repetitions which may have appeared on the REP test.

Each construct was paired twice with every other (i.e., 1 with 2, 2 with 1, etc.), and therefore if 15 nonreplicated constructs had been initially generated, the subject would make 210 comparisons (no construct being paired with itself). The instructions to the subjects were as follows:

In this task you are asked to consider the following: "If you know that a particular characteristic is true of a stranger, to what extent would you be able to assume that certain other characteristics are also true of that stranger?"

Taking one at a time, you will consider those attribute dimensions to the right of the grid (rows) as characteristics assumed to be true of the stranger, and those at the top of the grid (columns) as possible implications. For each comparison you will consider the amount of information that the row characteristic ("characteristic assumed to be true") provides you with respect to the column characteristic ("characteristic possibly implied"). For example, consider that the only thing one 'knows' about a stranger is that he/she is "friendly" (row characteristic -- assumed to be true); to what extent would you then be able to assume that the stranger is also "honest" (column characteristic -- possibly implied)?

For comparing each row characteristic to each column characteristic, use a 0 to 3 rating scale as follows:

0 = knowledge of first (row) characteristic gives _no information_ about second (column) characteristic

1 = knowledge of first (row) characteristic gives _a small amount of information_ about second (column) characteristic

2 = knowledge of first (row) characteristic gives _a moderate amount of information_ about second (column) characteristic

3 = knowledge of first (row) characteristic gives _a great deal of information_ about second (column) characteristic.

Compare each row characteristic to each column characteristic using this scale.

The Implication Grid technique (Imp Grid) was used for two different purposes in the present study. First, it was used to look at the general superordinate-subordinate positioning of constructs within a particular cognitive structure. Superordinate constructs are assumed to give more information concerning their subordinate counterparts than vice versa, and thus, in a situation where the construct "sincerity" yields "a great deal of information" (3 rating) concerning "honesty," whereas "honesty" yields only "a small amount of information" (1 rating) with respect to "sincerity," one could conclude that "sincerity" holds a superordinate position to "honesty" within that particular cognitive schema. In order that the laddering technique accurately reflect cognitive complexity it is essential that the procedure begin with subordinate constructs within the system. By summing the rows of the Imp Grid, information is obtained concerning the amount of information each construct implies with respect to the rest of the constructs within the system, and this may be used as an indicator of superordinancy. By selecting for laddering those constructs whose implication score resulted in the smallest sum, one can be assured that the bottom construct in the ladder implies relatively little about the rest of the generated constructs, and thus the assumption can be made that the laddering procedure is beginning at a relatively subordinate position within the cognitive structure. By laddering off of the most subordinate constructs within the system, probabilities are maximized for eliciting the greatest number of constructs from different hierarchical levels.

Second, the Imp Grid was used to arrive at what Hinkle (1965) referred to as "degree of connectedness", this measure being viewed as an indicator of integration within the system. Hinkle arrived at this score by simply counting the total number of two's and three's within the grid, but the present study found it necessary to divide this total by the total possible number of two's and three's so as to standardize for the fact that the different subject grids were of varying sizes. In addition, reciprocal implications were hypothesized to imply lack of differentiation between constructs, and thus, in a situation where construct A gave a moderate amount of information about construct B (rate "2") and B gave a moderate amount of information about construct A (rated "2"), these ratings were ignored in computing those connectedness scores which discounted reciprocals. However, if construct A gave a great deal of information concerning the presence of absence of construct B (rated "3") whereas construct B only gave a moderate amount of information concerning the presence of absence of construct A (rated "2"), then the relationship was not considered to be reciprocal and both ratings were included in the computation of those "degree of connectedness" scores discounting reciprocals. On the other hand, for those degree of connectedness scores which did not discount reciprocals, the scores simply consisted of the total number of two's and three's in the grid divided by the total possible number of two's and three's.

<u>Laddering Techniques</u>. Hinkle's (1965) development of the laddering procedure was precipitated by what he perceived as the necessity of taking into consideration hierarchical integration when investigating cognitive structure. In viewing the results of this measure as an indication of cognitive complexity, as the present study proceeds to do,

one is assuming that cognitive structure is pyramidal or triangular in shape and that those constructs located near the apex of the structure tend to be superordinate to and have broader "ranges of convenience" (Kelly, 1955) than do those constructs nearer to the base. As used herein, this procedure is simply an attempt to measure the number of hierarchical levels within a subject's cognitive structure.

The laddering procedure began by writing down the subordinate construct dimension selected on the basis of Imp Grid analysis, and asking the subject to explain why he/she had preferred the one pole of the construct to the other. Such questions were posed as, "What are the advantages of this side to that side?" (pointing) [Bannister & Mair, 1968, p. 84], and, "Why do you value this (pointing) over that? Does this (pointing) serve some higher function for you that is not served by that (pointing)?"

> Thus, for example, a subject might start from the dimension "reserved-emotional" (preferring to see himself at the "reserved" pole) and in answer to the question, "Why do you prefer to be 'reserved'?", might indicate that reserved people tend to be "relaxed" while emotional people tend to be "nervous." The dimension "relaxed-nervous" would then be taken as the first superordinate construction, with the subject preferring to view himself as "relaxed." Next (in answer to "why?") he might suggest that he preferred being relaxed because, in his opinion, being relaxed would lead to "getting on better with people," while being nervous might result in "difficulties with people." Here the second superordinate is "getting on better with people-difficulties with people"; the preferred pole is known, and a further query will lead on to the next act of superordination and so forth." (Bannister & Mair, 1968, p. 84)

After the first superordinate construct had been generated the subject was told that the procedure would continue until he/she reached the point at which the particular construct was seen to be valued in and of itself, such that it could be seen to serve no higher function for that particular individual. The subject was further told that it was very important that he/she make every effort to reach that point beyond which they could go no further in order that an accurate portrayal of their personal values could be recorded. In addition, occasionally the subjects were asked to go back and review their construct ladder in order to ensure that the movement was continually upwards in terms of their value system, and not downwards or merely definitional in character. Occasionally during this review process steps were added, deleted, or altered by the subjects.

Although uniformity with respect to the number of ladders produced by each subject was initially a part of the experimental design, there were rather large disparities between subjects with respect to the time required to generate construct ladders, with some subjects requiring as much as forty minutes to generate one long ladder of 10 or 11 constructs, whereas other subjects would complete four ladders of 3 or 4 constructs each in as little as fifteen minutes. Thus, although the number of ladders completed by subjects varied, the primary criteria sought by the experimenter in this task was the maximum number of hierarchical steps possible for each subject within a particular construct hierarchy (ladder). The time factor and the number of ladders attempted by subjects were deemed of secondary importance, and therefore were not controlled for in the present experiment. Following the elicitation of these additional constructs, they were added to the Implication Grid and the subjects were asked to complete the grid according to the same procedure previously followed.

Results

Hypothesis 1 -- Correlation between differentiation scores and laddering scores. This hypothesis predicting a non-significant correlation between differentiation sc.ores (high differentiation 'score' indicates low cognitive differentiation) and laddering scores was found to be inaccurate. Rather, a significant positive Spearman Rho correlation coefficient of +0.29 (N = 54, p = .016) was found, accounting for approximately nine percent of the variance. The Spearman Rho correlation coefficient was used due to the fact that the laddering scores are not necessarily equal interval measures.

Hypothesis 2 -- Correlations between two connectedness scores and the differentiation scores. The Pearson product-moment correlation between RepconWR and differentiation "scores" was +0.34 (N = 54, p = .016) indicating a significant positive correlation, whereas that between RepconNR and differentiation "scores" was -0.09 (N = 54, $p > .05$), and thus non-significant. Thus, only the first half of this hypothesis regarding the RepconWR scores, was supported.

Hypothesis 3 -- Four connectedness scores as possible discriminators of high, medium, and low laddering scores. This hypothesis went unsupported with respect to each of the four measures considered. Omnibus F values failed to reach significance for RepconNR scores (F (2, 51) = 0.54, p = .591), LadconNR scores (F (2, 51) = 0.06, p = .929), LadconWR scores (F (2, 51) = 0.28, p = .759), and RepconWR scores (F (2, 51) = 0.84, p = .442). Comparisons were also made between the extreme groups (high and low laddering groups) with each of the connectedness scores, however, the t test results for RepconNR scores (t (51) = 0.11, p = .909), LadconNR scores (t (51) = 0.36, p = .722) LadconWR scores (t (51) = 0.17, p = .865), and RepconWR scores (t (51) = 1.22, p = .277) all failed to reach the .05 level of significance.

Hypothesis 4 -- Differentiation, Laddering scores, RepconWR scores, RepconNR scores, and LadconWR scores as possible differentiators among Harvey's four conceptual systems. This hypothesis was supported with respect to all five possible discriminators in that "none" of these measures adequately differentiated among Harvey's four conceptual systems in the six one-way analyses of variance performed. Differentiation scores (F (3, 50) = 0.25, p = .861), laddering scores (F (3, 50) = 1.26, p = .299), RepconWR scores (F (3, 50) = 1.07, p = .373), RepconNR scores (F (3, 50) = 1.16, p = .334), and LadconWR scores (F (3, 50) = 0.22, p = .879) all failed to achieve significant F ratios with regard to Harveys four conceptual systems. In addition, all possible t test comparisons, using the pooled variance terms, were computed for each of these five measures, and even with the magnification of Type I errors accompanying such multiple t tests, no significant comparisons were found.

Discussion

Although the major thrust of this investigation involved the relationship between Conceptual Systems Theory and cognitive complexity, the study additionally sought to explore the adequacy of alternative indicators of cognitive complexity in an effort to more accurately reflect the actual number of dimensions which an individual uses in interpreting his interpersonal environment. Through the introduction of a cognitive structure model it was hypothesized that the factor of integration was essential as a complementary factor to that of differentiation in acquiring an accurate perspective with regard to cognitive complexity. Indicators of integration were in the form of four separate "degree of connectedness" scores as well as in the laddering score, the latter reflecting both differentiation and integration and therefore viewed as the best single index of cognitive complexity.

The results regarding Hypothesis 1 demonstrates a significant negative correlation between cognitive differentiation and laddering scores since a high differentiation "score" indicates low cognitive differentiation. This raises several interesting questions regarding the cognitive structure model presented herein. One of the basic theoretical underpinnings of this model was Werner's suggestion that differentiation and integration are complementary to one another, implying that as one increases, the other does likewise. This finding suggests that if Werner's speculations are correct, the differentiation scores may not only give an inaccurate estimate of cognitive complexity but may, in fact, lead on to conclusions opposite to those which reflect the actual cognitive complexity of the individual. An hypothesis may, therefore, be posed that traditional differentiation scores (Bieri, 1963; et al.) not only fail to account for cognitive construct integration, but actually misrepresent integration as a lack of differentiation in a significant number of cases. While it was originally hypothesized that this situation would occur enough so as to lead to a non-significant correlation between differentiation and laddering scores, it was unexpected to find the significant "negative" correlation emerge.

Findings regarding Hypothesis 2, dealing with correlations between RepconWR and RepconNR scores and differentiation scores, were only partially supported. The significant positive correlation between RepconWR scores and differentiation "scores," indicating a significant negative correlation between RepconWR scores and "cognitive differentiation", implies that a significant number of the implications for the Rep constructs were reciprocal, and therefore would be rated quite similarly across role categories in the differentiation analysis using the Rep technique. This would appear to indicate that reciprocal implications on the Imp Grid, interpreted as implying synonomous relationships between constructs, represent a lack of cognitive differentiation. RepconNR scores, however, were found to have a non-significant correlation with differentiation scores, a finding running counter to prediction. The lack of significant correlation may be accounted for by the fact that differentiation analysis misrepresents superordinate-subordinate relationships, as signifying a lack of differentiation rather than as representative of cognitive integration.

The findings regarding Hypothesis 3 demonstrated that none of the four connectedness socres were effective discriminators of the thre laddering groups, thereby contradicting predictions for each of the four connectedness scores. However, the result of these computations revealed that there was a greater difference between the $\underline{F}$ ratio for LadconWR scores and laddering groups and the $\underline{F}$ ratio for LadconNR scores and laddering groups than would have been expected since one of the premises adopted at the outset of this research was that there would be little variation between connectedness scores with reciprocals and those without reciprocals for the "laddered" constructs. However, upon observing these F values it was decided that a comparison of these two laddering connectedness scores should be made. A $\underline{t}$ test between LadconWR scores ($\underline{M}$ = 1.87) and LadconNR scores ($\underline{M}$ = 0.29) yielded highly significant results ($\underline{t}$ (53) = 20.99, $\underline{p} < .001$) indicating the inaccuracy of the initial assumption and demonstrating that constructs from different hierarchical levels may, indeed, be rated reciprocally in terms of implication schores. This finding clearly suggests that reciprocal implications should not be discounted when computing connectedness scores, and, as such, RepconWR scores and LadconWr scores emerge as the two most important connectedness measures in the calculation of cognitive integration.

The fact that neither LadconWR scores nor RepconWR scores discriminated among high, medium, and low laddering scores may be attributed to the fact that neither of these two connectedness scores accounts for both the differentiation and integration aspects of cognitive complexity, whereas in theory, at least, the laddering technique would appear to incorporate both of these components. One possible error with regard to relying upon RepconWR scores or LadconWR scores to represent cognitive complexity is conceivable in the situation where a subject has for his/her superordinate constructs the dimension "good-bad" or "pleasant-unpleasant," and tends to easily make the jump from the majority of his/her subordinate constructs to that superordinate dimension. The ease in jumping from subordinate to superordinate dimensions may well be due to a lack of intervening hierarchical levels, but nevertheless such a seemingly simplistic mode of interpreting situations could result in a relatively high connectedness score. It may be that the more hierarchical levels one has within his/her cognitive structure, the more difficult it is to perceive direct implications between very low-level constructs and superordinate constructs. Although this represents only one example of a situation wherein connectedness scores could misrepresent cognitive complexity, it is the contention of this investigator that laddering scores theoretically offer considerably more potential as accurate indicators of cognitive complexity in terms of the model of cognitive structure presented herein.

In introducing the triangular-shaped model of cognitive structure it was mentioned that a three-dimensional model could more accurately represent the pyramidal structure conceived of as reflecting the relationships between construct dimensions. Figure 2 represents a more complex two-dimensional model in three-dimensional form, and it is presented in this manner so as to make clear the potential differences in substructure (life areas) complexity. The important addition presented herein, therefore,

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Insert Figure 2 about here

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is that of substructures for different life areas. The need for such an addition becomes clear when considering the individual who demonstrates a great deal of cognitive complexity with regard to a particular field, whereas outside of that particular speciality he/she may demonstrate very poor capabilities in comprehending and coping with a vast array of other types of life situations. Perhaps this is best exemplified by the stereotyped image of the "mad scientist" who, while having a great deal of narrowly defined expertise, reveals himself as severely deficient in his capacity for interpreting (differentiating and integrating) other life areas (e.g., ethics, interpersonal relationships, government, etc.) with the same breadth of understanding that he demonstrates within his narrowly defined scientific interests.

Figure 2 presents various hierarchical substructures (e.g., interpersonal values, government, religion, ethics, the arts, science, vocation) within the cognitive structure, and each of these substructures, representing various possible life areas, has a separate potential for elaboration (hierarchical and horizontal). The "interpersonal values" substructure depicts a five stage ladder of the type tapped by the experimental laddering technique used in the present study. In order to demonstrate possible defining parameters of particular hierarchical levels, four descriptions of levels are offered for the vocational life area herein represented as "mechanics." Thus, whereas interpersonal values are dealt with through five hierarchical levels and mechanics by four, science for this particular individual may have fifteen levels and religion perhaps three. Although there may be a tendency for the various life areas to show similarities with respect to their structural complexities (Crockett, 1965), it would appear probable that considerable differences in structural complexity may exist across life areas for any particular individual. Future research comparing within-subject complexity variance across life areas with between-subject complexity (averaged across life areas) would be of considerable benefit in clarifying the extent to which an individual's cognitive structural complexity can be viewed as a singular quantity. The prediction of this investigator is that the complexity of cognitive structure will be found to be "relatively" constant across life areas. Such a study could also provide information regarding the degree of convergence towards a central superordinate construct when laddering from subordinate constructs associated with different life areas.

Regarding Hypothesis 4, the fact that neither the differentiation scores, laddering scores, nor connectedness scores discriminated among any of the four conceptual systems posited by Harvey, Hunt, and Schroder (1961) contributes further evidence that cognitive complexity is not a dimension contributing to such a classification system. Rather, it would appear that Conceptual Systems Theory draws primarily qualitative, rather than quantitative, distinctions among the construct dimensions used by each of the four system types. As such, the present findings concur with Harvey's more recent speculations (Harvey, note 3) that these conceptual systems are not sequentially invariant and probably do not discriminate between persons on the basis of the number of dimensions which they use interpreting their environments.

Finally, use of the laddering technique does appear to offer important insights into that construct which Bieri identified as cognitive complexity. An interesting and potentially significant aspect of this technique is that, in almost all cases, subjects appeared to enjoy the task, and oftentimes their intrigue was verbalized to the experimenter. Such an attitude may well lead to greater accuracy of results over tasks perceived as more tedious (e.g., Rep technique and implication grid), however, future studies may benefit by exploring the effects of the introversion-extraversion dimension on subjects' laddering scores since introverted subjects may have an advantage in this task. In addition, there is certainly room for further refinement of the laddering technique so as to make it more efficient as an evaluative measure, and the need for some standardization of the time factor across subjects in the generation of ladders is of fundamental importance to future investigators relying on the laddering technique.

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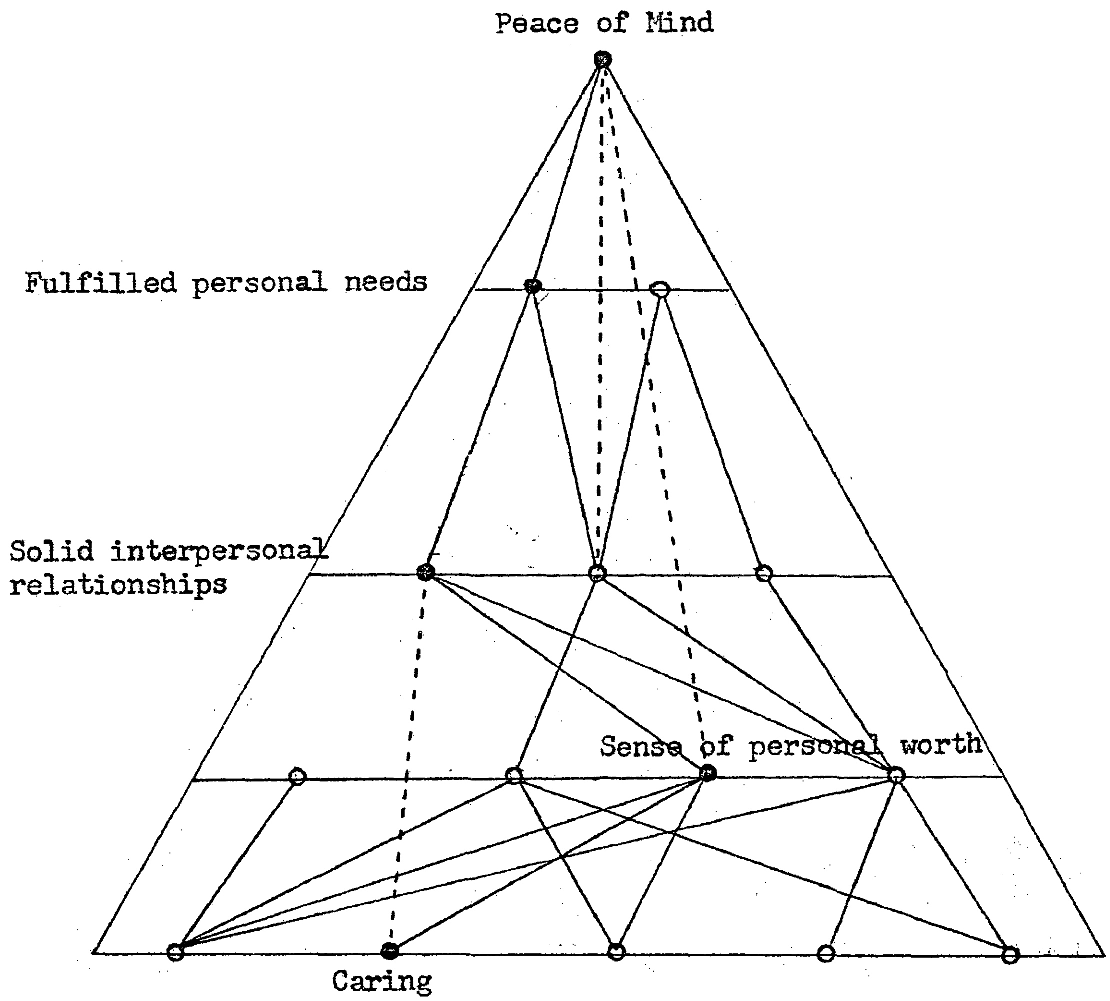
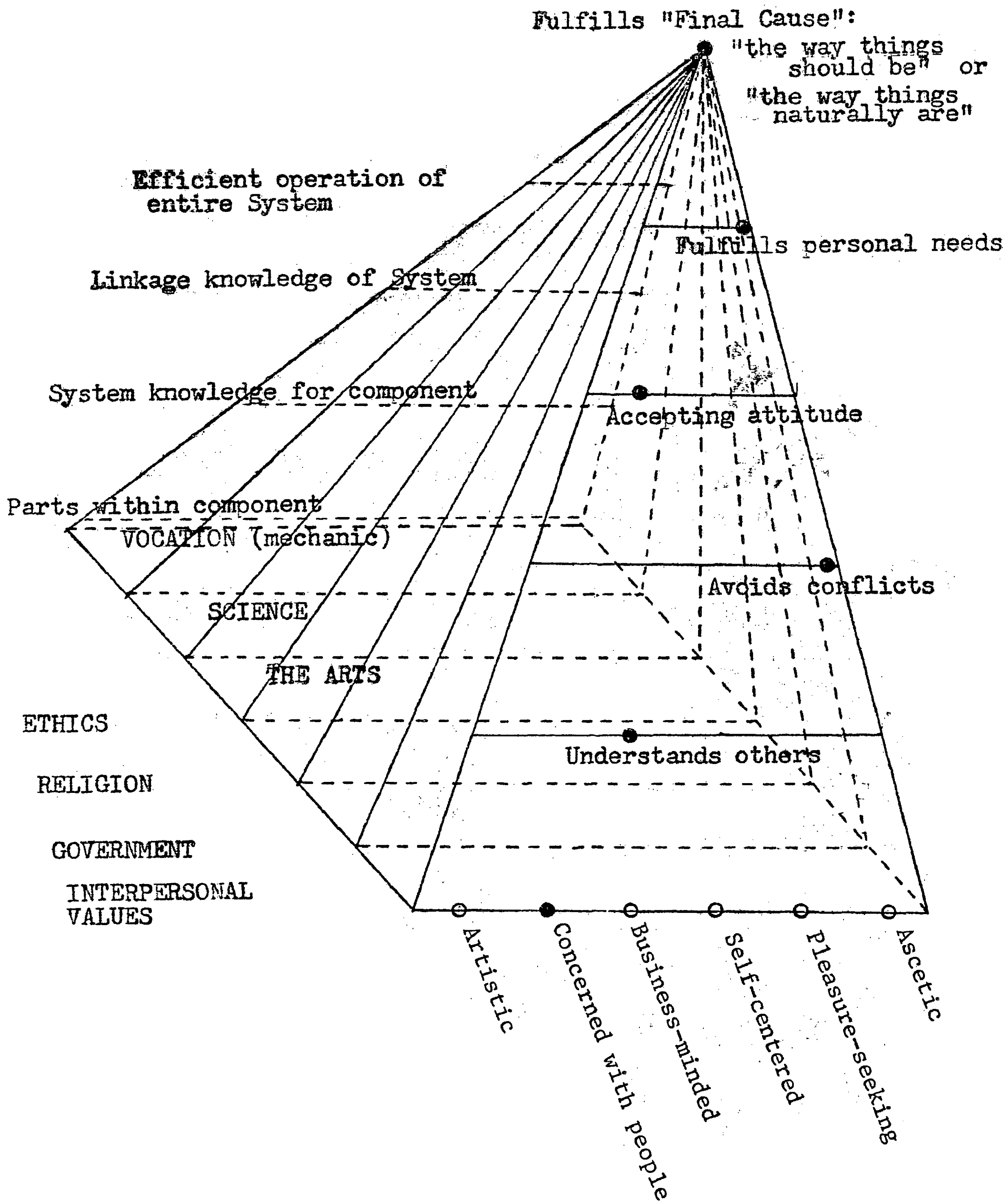
Figure Captions

Figure 1. Theoretical model of cognitive structure showing constructs (circles), perceived relationships between constructs of adjacent hierarchical levels (solid lines), and perceived relationships between constructs of nonadjacent levels (dotted lines). Included is a hypothetical ladder of four constructs elicited by laddering technique

Figure 2. Hypothesized three-dimensional model of cognitive structure including six life areas, a sample ladder within the "interpersonal values" life area, and general descriptions of the types of constructs at each of four different hierarchical levels for a mechanic.


Peace of Mind
Fulfilled personal needs
Solid interpersonal relationships
Sense of personal worth
Caring


Fulfills "Final Cause":
"the way things should be" or
"the way things naturally are"
Efficient operation of entire System
Fulfills personal needs
Linkage knowledge of System
System knowledge for component
Accepting attitude
Parts within component
VOCATION (mechanic)
Avoids conflicts
SCIENCE
THE ARTS
ETHICS
Understands others
RELIGION
GOVERNMENT
INTERPERSONAL VALUES
Artistic
Concerned with people
Business-minded
Self-centered
Pleasure-seeking
Ascetic