#### A DEVELOPMENTAL STUDY OF A DIMENSIONAL APPROACH TO COGNITIVE CONSISTENCY

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#### ABSTRACT

#### A DEVELOPMENTAL STUDY OF A DIMENSIONAL APPROACH TO COGNITIVE CONSISTENCY

By

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#### Statement of the Problem

The term "cognitive consistency" has been used to describe a number of models and theories of interpersonal cognition that have elaborated upon Fritz Heider's Cognitive Balance theory. Among the most recent extensions of this theory has been the dimensional view of consistency discussed by Scott (1969) and Phillips (1973).

This view suggests that people employ multiple dimensions when judging the relationship between elements of cognition. Consistency, in the traditional sense, conceives of only one dimensional judgment. The Phillips (1973) formulation allows for both the traditional unidimensional as well as a complex or multidimensional version of consistency. Thus, a person may be described as consistent at different levels of dimensionality.

The present study was conducted primarily to determine whether age-related changes in dimensional consistency

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occur. I.Q. level, sex, and situational variables were also examined relative to this multidimensional model of consistency.

Changes in dimensional development were predicted in accordance with organismic theories of development as represented by Werner and Piaget. Thus, increasing developmental differentiation from a global unidimensional state to multidimensional functioning was hypothesized.

#### Review of the Literature

The literature surveyed suggests that traditional consistency formulations do account for a good deal of interpersonal and object perception. However, the small number of developmental studies of consistency have not agreed concerning its change with age.

Dimensionality as an aspect of cognitive complexity was also reviewed. Although little developmental data bears directly on this topic, there is some support for both growth in the number of dimensions and within dimension articulation.

The organismic concept of differentiation was presented as providing a framework for studying dimensional changes in consistency.

#### Methodology

A total of 72 subjects participated in the present study, 24 each at the third, seventh, and eleventh grade levels. These groups contained an equal number of boys and girls and were further subdivided on the basis of I.Q. Consistency was assessed by asking <u>S</u>s to specify the degree of relationship on an eleven point scale between all 21 possible pairs of seven elements relating to a given topic. Three different topics were utilized - People I Know, School, and Occupations.

The three resulting matrices for each subject were factored and eigenvectors and eigenvalues computed for Rank I through Rank VII matrix models. Estimates of matrix variance were then computed from these eigenvalues. Dimensionality was determined by the rank of the first matrix which accounted for 75 percent of the total matrix variance.

#### Results

Age, sex, and I.Q. were found to be nonsignificant variables in regard to the dependent measure of dimensionality. Furthermore, a Rank I (one dimensional) model was not found to account for less matrix variance with increasing age as hypothesized.

Significant differences occurred, however, in the number of dimensions utilized by subjects across the three topics. Dimensionality increased as ego-involvement decreased from People I Know (X=1.917) to School (X=2.625) to Occupations (X=3.333). Differences between all combinations of these three topics were significant at the .0001 level of probability.

These differences due to topic were explained on the basis of stimulus dimensionality and positivity. Differential reinforcement and modeling practices provide an

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alternative explanation of situational differences.

In addition to these findings the implications and limitations of the study were discussed.

#### A DEVELOPMENTAL STUDY OF

#### A DIMENSIONAL APPROACH TO COGNITIVE CONSISTENCY

Ву

Richard Joseph Piotrowski

#### A DISSERTATION

Submitted to Michigan State University in partial fulfillment of the requirements for the degree of

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To My Parents

Matthew and Josephine Piotrowski

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## TABLE OF CONTENTS

	Pac	le
LIST O	F TABLES	7i
LIST O	F FIGURES	.i
Chapte	r	
I.	STATEMENT OF THE PROBLEM	1
	Varieties of Consistency Theory	2
	of the Term Consistency	8
	Cognitive Functioning	9
	Between Consistency and Complexity I Implications of Dimensionality for	.2
	Education	.6 8
II.	REVIEW OF THE LITERATURE	.9
	Cognitive Consistency Research with Adults . Developmental Studies of Consistency 2	.9 23
	Limitations of Developmental Studies of Consistency	29
	The Present Response to the Limitations of Previous Research	31
	Dimensionality as an Aspect of Cognitive Complexity	33
	Cognitive Differentiation: The Organismic View	35
	Summary	19
III.	METHODOLOGY	1
	Sample	1
	Procedure and Test Stimuli	3  6

IV.	ANAL	YSES	AND	RESU	LTS	•	• •	•	•	•	•	•	•	•	•	•	•	•	49
		Intro Summa	duct ary o	ion f the	e Re	sul		•	•	•	•	•	•	•	•	•	•	•	49 55
۷.	DISC	USSIC	ON OF	THE	RES	ULT	s.	•	•	•	•	•	•	•	•	•	•	•	57
		The L Dimer	Jnidi Ision	mens: alit	iona y in	l M Re	ode spe	el d ect	of to	Cc	ns	is	te	enc	у	•	•	•	57
		Grade	e, I.	Q., (	and	Sex	•	•	•	•	•	•	•	•	•	•	•	•	5 <b>9</b>
		Dimer	sion	ality	y in	Re	spe	ect	tc	r c	lop.	ic	:	•		•	•		61
		Summa	ary o	f th	e Di	scu	ssi	.on	•	•	•	•	•	•	•	•	•	•	65
VI.	SUMM	IARY,	IMPL	ICAT	IONS	, A	ND	LI	rin	ra 1	CIC	NS	}	٠	•	•	•	•	67
		Summa Impli Impli Limit	cati cati cati atio	ons o ons i ns .	of t for	he Fut	 Pre ure	ser Re	nt ese	St ear	uđ ch	ly ·	•	• • •	• • •	• • •		• • •	67 68 71 72
REFEREN	NCES	•••	•••	••	•••	•	• •	•	•	•	•	•	•	•	•	•	•	•	74
Appendi	ix A.	Rel	atio	nshij	p Ra	tin	g I	inst	tru	ıct	ic	ns		•	•	•	•	•	78
Appendi	ix B.	Rat	ing	Scale	e.	•	• •	•	•	•	•	•	•	•	•	•	•	•	81
Appendi	ix C.	Var Eac Sub	rianc ch Ma oject	e Es trix by '	tima Ran Topi	tes k M c	Ge ode	ener el :	rat for	ed E	l b Cac	y h	•	•	•	•	•	•	82

## LIST OF TABLES

Tab	le	Page
1	Experimental design	. 41
2	Mean I.Q. scores of the sample	. 43
3	Mean ages of the sample	. 43
4	Multivariate analysis of variance of repeated measures for matrix variance estimates using a Rank I model	. 51
5	Multivariate analysis of repeated measures for dimensionality	. 52
6	Univariate analyses of variance for comparisons between topics	. 50

## LIST OF FIGURES

Figure						J	?age
1 Average number of dimensions utilized subjects on each of the three topics	by	•	•	•	•	•	55

#### CHAPTER I

#### STATEMENT OF THE PROBLEM

The idea that people attempt to maintain consistency in their cognitive functioning and behavior forms the basis for a number of social psychology theories. Among the formulations sharing this common framework are Cartwright and Harary's (1956) "Structural Balance," Abelson and Rosenberg's (1958) "Symbolic Psycho-Logic," Osgood's (1955) "Congruity Principle," and, perhaps the best known, Festinger's (1957) "Cognitive Dissonance" theory. These theories also all assume that the absence of consistency produces a tension which results in a reorganization to restore consistency. (Kiesler, Collins, and Miller, 1969)

The first formal statement of consistency is found in the work of Fritz Heider (1946, 1958). All of the above theorists invariably acknowledge some form of intellectual debt or primacy to Heider's Cognitive Balance theory. Heider's model is concerned with the positive and negative relationships within a P-O-X triad where P and O are people and X is another person or object. Balance exists within such a triad when all of the relationships are

positive or when two relationships are negative and one is positive. Imbalance is obtained when two of the relationships are positive and one is negative. Three negative relations constitute an ambiguous case for balance theory. (Heider, 1958)

While a balanced state is seen by Heider as comfortable and not under pressure to change, the implications of imbalance are very different. Heider (1958) assumes that "... if a balanced state does not exist, then forces toward this state will arise. If a change is not possible, the state of imbalance will produce tension." (Heider, 1958, p.201)

Other consistency formulations will now be reviewed to survey both how they elaborated upon and departed from Heider's basic model.

#### Varieties of Consistency Theory

The theories to be reviewed extend the original model in a number of ways. The most common elaborations include an increased quantitative specification of the degree of imbalance and extension of the number and kinds of relationships covered by the theory.

A. Cartwright and Harary's Structural Balance

Cartwright and Harary (1956) offered their theory of Structural Balance to clear up some of the ambiguities contained in Heider's original formulation and to extend balance to a wider range of situations.

The tool they used to accomplish their objectives was the mathematical theory of linear graphs. This enabled them to convert Heiderian concepts such as "entity," "relation," and "sign of a relation" into the graphic representations of "point," "directed line," and "sign of a directed line." Such a visual representation has enabled them to make a number of theoretical and quantitative advances.

Unsymmetrical relationships, for instance, can be accommodated by Structural Balance. An example of such a relationship occurs when a person does not reciprocate another's liking. Heider's system did not provide for such a possibility. Similarly, the absence of a relationship can be noted in addition to positive and negative bonds.

Units of greater than three entities can be studied using this approach. Closely related to this extension was Cartwright and Harary's desire to describe consistency in units beyond that experienced by a single person. Thus, they also use their approach to study sociometric structures, communication networks, and patterns of power.

Perhaps most importantly, however, Structural Balance represented a quantitative refinement over the original balance model. While Heider discussed only globally "balanced" or "unbalanced" situations, Cartwright and Harary were able to specify both intermediate degrees of consistency and consistency at a given point in a structure.

B. Abelson and Rosenberg's Symbolic Psycho-Logic

Like Cartwright and Harary, Abelson and Rosenberg (1958) extended Heider's view of consistency to account for relationships other than positive and negative. They also were able to specify intermediate degrees of balance.

Symbolic Psycho-Logic introduced a square matrix to represent the relationships between any number of cognitive elements (verbal labels attached to elements of thinking) which comprise a given topic, or "conceptual arena." The relations between elements can be of four types: positive (p), negative (n), null (o), or ambivalent (a).

Rosenberg and Abelson (1958) exploited the mathematical advantages of the matrix in developing an index of imbalance. They defined the degree of imbalance of a structure as the smallest number of changes that are necessary to restore balance. This is, in effect, a least effort approach to redressing imbalance. It is much more specific than Heider was concerning which relationships are likely to change as a result of imbalance.

C. Newcomb's Symmetry Model

Newcomb's (1953) consistency formulation differs from the basic model primarily in its area of emphasis and application-communicative acts. Like Heider, Newcomb is concerned with an interdependent three element system. This system involves a person (A) who communicates to a person (B) about something (X). A symmetrical relation among these

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elements is tantamount to a balanced state. However, it is in the results of imbalance that Newcomb enlarged upon Heider's ideas. According to Newcomb (1953) the "strain" toward a state of equilibrium results in verbal communication from A to B in regard to X. The communicative act which is the crucial aspect of Newcomb's theory is thought to result because of the secondary reward value attached to previous attempts at communication.

Although Newcomb acknowledges his theorizing as merely a "special case of balance," the theory is felt by some (Kiesler, Collins, and Miller, 1969) to have resulted in some of the most stringent empirical tests of consistency. D. Osgood's Congruity Principle

Osgood and Tannebaum's (1955) Congruity Principle is another consistency model which centers around the effects of communications on attitudes. In this case only two elements are considered - a source and a concept such as a person, institution, or idea which is evaluated by the source. Through the use of their semantic differential technique they have been able to develop a highly quantitative approach to the specification of the effect of a communication upon both a source and the object of the source's communication.

Using the semantic differential technique each of two objects of cognition can be located somewhere from +3 to -3 on the evaluative scale. The linking relationship between these two elements takes the form of an "assertion"

which can be either associative (positive) or dissociative (negative).

Osgood and Tannebaum (1955) describe congruity (and consistency) when they state that "In this simplest of states in which human thinking operates, sources we like should always sponsor ideas we like and denounce ideas we are against, and vice versa." (Osgood and Tannebaum, 1955, p.44) In such a situation there is no pressure to change the evaluation of either element. When incongruity occurs, however, the pressure toward congruity operates to change the initial evaluation of elements. A formula has been developed to specify the magnitude and direction of this change.

The congruity principle has made considerable quantitative contributions to consistency theory. This can be seen in both the specification of attitudinal elements and the prediction of change resulting from inconsistency. E. Festinger's Cognitive Dissonance

Festinger's (1957) theory of cognitive dissonance is undoubtedly the best known of the consistency formulations. Despite its popularity, its basic premises are remarkably similar to Heider's original balance statement. Festinger, in fact, suggests that if the words "dissonance" be substituted for "imbalance" and "consonant" be replaced for "balanced" then he and Heider are indicating the same basic processes.

Festinger deals primarily with a two element system.

Two elements are dissonant when the opposite of one would follow from the other. Thus, smoking cigarettes despite knowing about the Surgeon General's report on its effects is an example of a commonly occurring dissonance.

The major difference (Kiesler, Collins, and Miller, 1969) between dissonance theory and the original balance model involves Festinger's concept of implication. Festinger (1957) notes that there are many pairs of elements where neither an element nor its opposite follows from another element. Such a relationship is seen as irrelevant. Thus, many Heiderian imbalanced situations which might be construed as dissonant are merely viewed as irrelevant by Festinger.

Festinger (1957) discusses the magnitude of dissonance without quantifying it precisely. The amount of dissonance is determined by both the importance of the elements involved and the proportion of relevant elements dissonant with the one in question.

While Festinger's theoretical framework is not overly complicated, his ingenious work involving the application of his theory in areas such as decision making, forced compliance, exposure to information, and social processes has taken consistency theory into previously unexplored realms.

### Consistency Theory and Other Uses of the Term "Consistency"

The term "consistency" as used by the theorists just discussed refers to a group of theories which postulate a tendency toward perceiving the relationship between persons and objects so that there is harmony or balance within the cognitive system of the perceiver. Another common use of the term "consistency" is made within the field of child development. This other use of the term is in reference to the continuity or stability of personality development over time and across situations.

Kohlberg (1972) discusses three such types of continuity: (1) trait stability, (2) continuity through sequential stage development, and (3) the stability of idiographic individuality. Trait stability is defined as "... the correlation between an adult behavior trait (or symptom) and a similar childhood behavior trait." (Kohlberg, 1972, p.1221) Continuity through invariant developmental sequences can be seen in a number of "stage" theories such as those offered by Freud, Erickson, and Piaget. In regard to the idiographic approach to stability Kohlberg states "This approach is concerned with the relative salience of traits to one another in the individual, with their organization, and with the individual's style or manner of expressing these traits, rather than with the individual's rank on a trait compared with the rank of others." (Kohlberg, 1972, p.1225)

Traditionally, consistency theorists have not been concerned with the stability of their construct. Because of their avoidance of such considerations one can only assume that they viewed the tendency toward consistency as stable over time and across situations. The present study will provide empirical evidence on these questions.

#### Consistency and Complexity in Cognitive Functioning

McGuire (1966) concluded a review of the status of consistency theories by noting that there exists a group of psychologists who draw their inspiration from a source which, if not contradictory to consistency theory, is at least the "reverse" of it. This group is probably best represented by the work of Berlyne (1960), Fiske and Maddi (1961), and Fowler (1965). McGuire contrasts their "complexity" views with consistency notions of man when he states that:

> Here (complexity) we come upon a romantic notion of the organism, very different from the classic notion of consistency theories. The latter classic organism has a penchant for stability, redundancy, familiarity, confirmation of expectance, avoidance of the new, the unpredictable. Complexity theory's romantic organism works on a guite different It has a stimulus hunger, an economy. exploratory drive, a need curiosity. It takes pleasure in the unexpected, at least in intermediate levels of unpredictability. It wants to experience everything; it shows alternative behavior; it finds novelty rewarding. (McGuire, 1966, p.37)

Another cognitive approach which postulates movement toward a different kind of complexity can be found in the organismic theories of development. (Werner, 1948;

Piaget, 1950). For Jean Piaget (1950) the growing child's cognitive abilities become increasingly differentiated as he passes from the sensorimotor to the preoperational to the concrete operational and, finally, to the formal operational stage of development. Each stage represents a qualitatively different form of cognitive organization than its predecessor. Furthermore, development through these stages has been shown to be a universal phenomenon.

Similarly, Werner (1948) states that "... the essence of organic development is the steadily increasing differentiation and centralization, or hierarchic integration, within the genetic totality." (Werner, 1948, p.53)

Although organic theories of development have obvious implications for cognitive balance, Heider (1958) made virtually no mention of the developmental course of balance and research in this area has also ignored such considerations for a long time. Perhaps the reason for this neglect can be attributed to Heider's roots in Gestalt psychology. Zajonc (1968) noted that Heider assumed social perception to be determined by both Gestalt-like structural principles and dynamics. Since the Gestalt view maintains that psychological structures are agenetic, the question of their development is avoided.

Piaget (1950) in the <u>Psychology of Intelligence</u> considered at some length the Gestalt view of intelligence.

He ended his critique of the Gestalt position by stating that:

On the whole then, we see that Gestalt theory although correct in its description of forms of equilibrium or well-structured wholes, nevertheless neglects the reality, in perception as in intelligence, of genetic development and the process of construction that characterises it. (Piaget, 1950, p.66)

On the other hand, Flavell (1963) noted that the usefulness of Piagetian theory has yet to be demonstrated in the area of "warm-blooded cognition" which includes consistency theory.

> The question of development here is an especially interesting one, because the net effect of many of these semicognitive operations is in some sense to distort reality, to arrive at a nonveridical apprehension of it in the service of some need. This is in sharp contrast to the impeccably ligical and reality-bound operations the genesis of which Piaget has studied. Is there really a development towards nonverdicality contemporaneous with the Piagetian development away from it? Is it true that the growing child not only develops sharper and sharper instruments for dissecting reality but also increases his proficiency in defensive self-deceptions, in reducing the strain of cognitive dissonance, incongruity, etc., at the expense of realistic accommodations, and all the rest? (Flavell, 1963, pp.441-442)

Thus, it would appear that the question concerning whether consistency undergoes any significant changes with age has not yet been answered. An extension of consistency theory which might prove amenable to a developmental analysis will now be considered.

#### Attempts to Provide an Interface Between Consistency and Complexity

A theory which could provide for both consistency and complexity would undoubtedly be a very attractive and useful formulation. The development of such a model has not been completely ignored as is evidenced by the work of Scott (1969) and Phillips (1973). To provide a necessary background for their developments. Bieri's (1961, 1966) work on complexity will be mentioned as it is his explication of complexity that is most closely related to the Scott and Phillips formulations.

Bieri (1966) considers complexity to be represented by the dimensionality of a person's judgments. Thus, "Cognitive complexity may be defined as the tendency to construe social behavior in a multidimensional way, such that a more cognitively complex individual has available a more versatile system for perceiving the behavior of others than does a less cognitively complex person." (Bieri, 1961, p.14) Bieri contrasts this to complexity approaches which focus on the differentiation of concepts and categories.

He further considers dimensions in terms of their articulation. This may be thought of as discrimination within a dimension. Much of Bieri's research has aimed at discovering the factors which affect articulation.

Scott (1966) borrows from Bieri the concepts of dimensionality and articulation as ways that attributes

(characteristics of objects) are organized. "Images" are combinations of characteristics or attributes which exist in a multidimensional space. Scott has identified a number of ways in which images from common cognitive domains are related. Two of these measures- Affective Balance and Affective-Evaluative Consistency are derived from the traditional consistency position. Both of these measures were found to be negatively correlated with dimensionality and an ambivalent view of objects. These results were obtained by Scott (1969) using a number of different measures for assessing dimensionality.

The model developed by Phillips (1973) also views the attribute space of an individual's cognitive structure as organized along a certain number of dimensions. Through the use of a matrix approach to cognitive structure he has developed a measure of dimensionality which is sensitive to both consistency and complexity.

The matrix approach was described earlier as Abelson and Rosenberg's (1958) contribution to consistency theory. Basically, this approach involves determining what set of cognitive elements are relevant for a subject in relation to a given topic. After a set of elements is identified, a subject is asked to make a rating of the intensity of the relationship between each pair of elements in the matrix.

Both Phillips (1967) and Abelson (1967) independently proposed that when a matrix were factored, the size

of its largest non-zero characteristic root, or eigenvalue, is a good measure of the degree of balance of that matrix. A balanced matrix is, in effect, a Rank I matrix. The person operating on consistency principles exclusively could be termed one dimensional, a dimension which Phillips (1967) showed could be labeled as "evaluation." Mathematically, the relation between elements e; and e; for such a person is given by the following formula:

## $r_{ij} = \infty e_i e_j \qquad \infty = \sum e_i^2$

However, if an individual is complex in terms of using more than one dimensional mode to make relational judgments the Rank I hypothesis is no longer tenable. When multiple dimensions are utilized, the rank of the structure matrix increases with the number of dimensions (eigenvectors) needed to reproduce the matrix with a given degree of accuracy. (Phillips, 1973) Thus, the rank of a matrix can describe the dimensional complexity of the person who generated it. Mathematically, the complex person's rating for the degree of relationship between two elements is given by the following formula:

# $r = \sum_{k} \sum_{i=1}^{k} \sum_{j=1}^{k} \sum_{j=1$

Such a dimensional approach to consistency provides a mechanism for redressing inconsistency that is highly compatible with organismic theories of development. A person who is confronted by inconsistency at a given level

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of dimensionality may restore consistency by adding a new dimension upon which his cognitive elements can be ordered. Thus, through the process of "dimensional augumentation" consistency is restored. Furthermore, at a higher level of dimensionality the person is better able to cope when confronted with a new potentially inconsistent situation.

The adaptive nature of dimensional augumentation is particularly evident when compared to other mechanisms of consistency restoration. Among such mechanisms mentioned by Abelson (1968) are denial, rationalization, bolstering, and transcendence. The effect of these operations is largely to distort reality while restoring consistency. In addition, they must be applied anew whenever inconsistency arises. Compared to dimensional augumentation they provide a very inefficient way of maintaining consistency.

To summarize, the Phillips extension of consistency just presented enlarges the theory to accommodate the complex person. At the same time, the traditional formulation is retained in the case of the one dimensional person. Thus, the consistency and complexity views of man are no longer competing theoretical positions. Instead, consistency may be defined at different levels of complexity. It is this statement of consistency that will be studied from a developmental perspective in the present study.

#### Implications of Dimensionality for Education

Information concerning differences in dimensionality between students at different grade levels or between teachers and students could be useful in several ways.

With the introduction of a number of approaches for promoting affective education such as the Human Development Program (Bissell and Palomares, 1973), Dimensions of Personality (Limbacher, 1970), Developing Understanding of Self and Others (Dinkmeyer, 1970), and Value Clarification (Simon, 1972) the developmental course of "warmblooded" cognition assumes additional importance. The assumption that Piagetian intellectual development applies to these areas as well as to more cold kinds of cognition is, as Flavell (1963) concedes, yet to be demonstrated.

The content of these approaches - interpersonal relationships, self acceptance, fears, personal values, feelings, etc. has not traditionally been the specialty of the classroom teacher. Just as the teacher must adjust traditional subject matter to the cognitive level of his students, so must such affectively charged material be tailored to the student's level of understanding. The dimensional approach to consistency provides a framework in which such adjustments could be made.

In regard to classroom communication concerning affective material, differences in teacher-student dimensionality may have interesting effects. Ideally, communication would appear to be maximally effective when two

people are operating at the same level of dimensional complexity. However, the highly dimensional teacher who does not take into account the potentially lower level of complexity of his students is liable to be misunderstood when affectively charged topics are discussed.

Runkel (1956) conducted an interesting study dealing with the effects of teacher-student differences in dimensionality when only one dimension is considered. Both teachers and students rank ordered all possible combinations of five statements presented three at a time. Similarity between dimensions used by teachers and students was determined by the Coombs "unfolding technique." It was found that those students who order attributes on dimensions similar (collinear) to their teacher receive higher grades than those who employ different dimensions (non-collinear). This result was found to be independent of scholastic ability and similarity between teachers and students concerning which statements were rated most highly. Similar results would appear likely if number of dimensions were the independent variable rather than unidimensional differences.

Differences in the number of dimensions between students at different grade levels would have important implications for curriculum construction. A lesson on "ambivalent feelings," for instance, would require at least a two dimensional structure for students to fully comprehend.

If increasing dimensionality with age could be demonstrated, then dimensional augumentation could be

seen as a valid goal of education. Kohlberg (1973) provides a parallel situation in his arguments for moral education from a cognitive-developmental perspective. He argues that traits which show a universal age related development obviously have an adaptive value and should be fostered. Kohlberg's method of exposing students to arguments and discussion at one level above their current level of functioning may also have some applicability as a way of enhancing dimensional augumentation.

#### Statement of Purpose

The primary purpose of the present study is to assess how a dimensional approach to cognitive consistency is affected by age. Other variables to be examined will include I.Q. level, sex, and the situation in which consistency is being assessed. Hypotheses concerning dimensional growth will be made in light of organismic theories of development as represented by the work of Piaget (1950) and Werner (1948).

#### CHAPTER II

#### REVIEW OF THE LITERATURE

The present chapter will review the experimental evidence for the key theoretical concepts discussed in Chapter I. The first section will summarize the research dealing with cognitive consistency in adults. A detailed consideration of the small number of studies examining consistency from a developmental perspective will follow. Cognitive complexity as a dimensional phenomena will then be considered. It is this explication of complexity that is most pertinent to the present research. Finally, the work of Piaget and Werner will be examined for implications for developmental processes which may affect the tendency toward consistency.

#### Cognitive Consistency Research with Adults

Most of the research surveyed by Zajonc (1968) dealing with a preference for balanced (consistent) states utilized hypothetical situations rated for their "pleasantness" or "unpleasantness." These results generally support consistency expectations with some important qualifications. Illustrative of both the support for and the shortcomings of consistency theory are

studies by Jordan (1953) and Price, Harburg, and Newcomb (1966).

Jordan (1953) presented subjects with 64 situations involving two people (P and O) and an impersonal entity Half of these hypothetical situations were balanced (X). and half unbalanced. The basic hypothesis that balanced situations would be perceived as more pleasant was supported. However, some exceptions to this pattern were noted. Positive relationships were found to influence pleasantness. Thus, a balanced all-positive situation was seen as more pleasant than a balanced state containing two negative and one positive relationship. In light of the basic theory, both of these cases are equally well balanced. Furthermore, the relationship between P and O (both people) was more important in predicting pleasantness than the P-X (person-object) relationship which, in turn, was more important than the O-X bond.

Cartwright and Harary (1965) reinterpreted Jordan's data by differentiating between a negative relationship and the absence of a relationship. Jordan (1953) did not make this distinction as the absence of a relationship constituted a negative bond in traditional Heiderian terms. By considering triads as "vacuously balanced" when a relationship was absent, Cartwright and Harary found that such triads were perceived as more pleasant than unbalanced states but not as pleasant as balanced states.

Price, Harburg, and Newcomb (1966) constructed balanced and unbalanced P-O-Q triads where O and Q were people known to the subject (P). These triads were rated by subjects on an uneasy-pleasant scale. Two balanced triads with positive P to O relationships were rated pleasant by 87 percent and 89 percent of the subjects respectively. Imbalanced situations with a positive P to O relationship were rated "uneasy" by 89 percent and 84 percent of the subjects. These results provide an encouraging degree of support for the consistency position. However. balanced triads containing negative P to O bonds were seen as "pleasant" by only 35 percent and 33 percent of the subjects. Price, Harburg, and Newcomb (1966) explain the failure of some situations to conform to theory as due to the effects of uncertainty, ambivalence, and lack of engagement when a P-O bond is negative.

"General but not unequivocal support" for a preference for consistent states was also found by Zajonc (1968) in studies in which subjects were asked 1) to predict a missing bond, 2) to learn hypothetical consistent and inconsistent structures, and 3) to learn social structures. Natural interpersonal situations have also been analyzed to a limited extent. One study involving the galvanic skin response (Burdick and Burnes, 1958) supported consistency theory by finding physiological correlates of inconsistency.

Brehm and Cohen (1962) surveyed a substantial number of studies testing propositions derived from the cognitive dissonance formulation of consistency. Much of
this research bears directly on the consistency postulate that inconsistency, or dissonance, results in tension and subsequent reorganization in the interest of increased consistency. Support for many of the major derivations of the theory was found. Dissonance effects were demonstrated in a wide variety of areas including opinions on issues, information recall, perceptual distortion, behavioral change, and motivation. While Brehm and Cohen (1962) concluded that the theory has proved to be a "very powerful" predictive tool, they do concede that there is one obvious disconfirmation of the theory. This exception concerns the avoidance of dissonant information. Insko (1967) adds the research on reward in forced compliance situations as also failing to support dissonance predictions.

Research reviews of either consistency theory as a whole or of one of its derivatives are in agreement that there is support for the basic consistency hypothesis. (Zajonc, 1968; Brehm and Cohen, 1962; Kiesler, Collins, and Miller, 1969; Insko, 1967) However, such support is not unqualified because of such exceptions to theory as the positivity bias and the differential effects of various P-O-X bonds. It is also rare when a reviewer fails to mention the interest shown in magicians, puzzles, paradoxes, and science fiction as everyday sources of embarassment for the consistency position.

#### Developmental Studies of Consistency

Consistency as a developmental phenomena was literally ignored for a long time. Recently, however, a number of studies exploring its developmental course have appeared. Much of this interest has been spurred by investigators attempting to apply the developmental theories of Piaget (1950) and Werner (1948) to the question of consistency. The first two studies to be reviewed (Weir, 1960; Smith, 1965) employed relatively older groups. Studies using younger but better controlled groups (Shaw, 1968; Atwood, 1969; Blanchard and Price, 1971) will then be reviewed. Finally, a nondevelopmental but direct application of consistency to an actual classroom setting (Carville, 1968) will be mentioned.

Weir (1960) provided the first developmental study of cognitive consistency as a secondary explanation for a study concerning fact-value differentiation. Subjects (Graduate students, Undergraduates, and Evening College students) were asked to rate their attitude toward three topics: education, college, and university teachers. Statements concerning these topics were rated as "true-untrue" (fact judgments) and "favorable-unfavorable" (value judgments). Based on Werner's concept of differentiation, it was hypothesized that fact-value differentiation would be greater in the Graduate student than Evening College group and in an academically "high" as opposed to "low" undergraduate group. Greater fact-value differentiation as

represented by small correlation coefficients was found in the higher developmental groups (Graduate students and high Undergraduates) than with their lower developmental counterparts (Evening College students and low Undergraduates).

Weir (1960) related his finding to consistency theory by noting that what was described in his study as a high fact-value correlation was equivalent to Heider's preference for balanced situations. He concluded that "From a combination of the approaches of Werner and Heider it would seem that the ability to tolerate "unbalanced situations" is a developmentally high-level function." (Weir, 1960, p.81)

Smith (1965) studied groups with average ages of 13.3 (Boy Scouts), 17.6 (High School students), 22.6 (University students), and 57.7 (Veterans Hospital patients). Age variation within each of these groups was considerable. Subjects were asked to finish filling out partially completed Allport-Vernon-Lindzey Scales which created hypothetical people either similar or dissimilar to the subject. Dependent measures included a score for the differential attribution of similarity and a rating of the subject's willingness to have each of the hypothetical people as a work and as a leisure associate. An increasing tendency toward consistency was found with age up to the oldest group which reversed this trend by showing significantly less consistency than the younger groups. Neither sex nor intelligence had any effect on consistency.

The results of the Weir (1960) and Smith (1965)

studies stand in direct contradiction to one another. Surprisingly, each author offers his results as proof that the Wernerian process of differentiation has occurred. According to Weir (1960), differentiation proceeds from a global state of consistency where fact and value judgments in his study were fused to a state where these judgments are increasingly independent in the more mature person. Thus, an apparent tolerance for inconsistency is concomitant with developmental growth. For Smith (1965), however, the occurrence of differentiation results in being able to see people who are both similar and dissimilar to us more clearly. Thus, we are better able to separate our likes from our dislikes and consistency is enhanced by development.

Methodologically, both of these studies leave something to be desired. Neither bothered to control for relevant group differences and age varied considerably around the group means. Furthermore, developmental differences which occur before the teenage years could not be detected as the youngest group in either study was 13.3 years old.

Smith (1965) in his discussion of the differences between his and Weir's results points to the different nature of the two tasks as contributing to the discrepant results. Unfortunately, later developmental studies have not pursued the question of cross-situational stability in regard to consistency. One objective of the present study will be to provide some information on this point.

Younger and better controlled groups were examined in the developmental studies by Shaw (1968), Atwood (1969),

and Blanchard and Price (1971).

Shaw (1968) studied subjects at 11, 13½, 16½, and 19 years of age. Consistency was assessed using a verbal form of the Heider-Simmel animated cartoon characters also used in adult studies. The actions of three story characters were described by short sentences. Subjects rated personality characteristics and relationship patterns among the characters to provide measures of consistency. Consistency was found to be a significant organizational principle in all groups. However, age and sex were not found to be significant variables.

Shaw's (1968) failure to find developmental changes in consistency may be due to his failure to extend his study developmentally low enough. A similar limitation was noted in the Weir (1960) and Smith (1965) studies. Shaw's four groups ranged in age from 11 to 19. In terms of Piagetian theory which Shaw used to predict age related differentiation, all four groups have entered the stage of formal operations. A more likely place to look for the effects of differentiation would be between groups in adjacent Piagetian stages. Atwood (1969) and Blanchard and Price (1971) made such comparisons with interesting results.

Atwood (1969) found evidence for age related changes in consistency with groups corresponding to the following ages and Piagetian stages: intuitive or preoperational thought (5-6 years), concrete operations (8-9 years), and formal operations (11-12 years). Subjects were presented with stories involving three children. Two relationships

between the members of a triad were provided and the subject was to indicate the nature of the final missing relationship. Preoperational subjects did not conform to consistency theory. Instead, their responses indicated an inability to see the implications of the two relationships given for the final missing relationship. Concrete operational subjects and formal operational subjects, on the other hand, did show a great deal of adherence to consistency in completing the triads. However, the responses of subjects in these two groups to a post-test interview indicate important differences between their "needs" for consistency. Atwood (1969) reports that "Concrete operational thought conforms to the balance model with surprising rigor, often reacting as if the implications of each relation within a triadic system for the other two were purely a matter of logic." (Atwood, 1969, p.83) More flexibility was noted in the formal stage subjects who saw external circumstances as also determining whether or not consistency would prevail. Thus, "For the formal operational child, a situation of cognitive balance represents only one of many relational arrangements which are possible in a given three-person system." (Atwood, 1969, p.84)

Blanchard and Price (1971), also studying changes between Piagetian levels, failed to confirm the direction of Atwood's finding when the affective reaction to triadic situations was measured. They tested one group of preoperational subjects (first graders), two groups of concrete stage subjects (second and fourth graders), and two groups

at the formal stage (eighth graders and college freshmen). Each subject was presented with eight triadic situations containing all possible combinations of consistent and inconsistent relationships. Five point scales were used for subjects to rate how each situation felt on "good-bad" and "happy-sad" continuums. Both the preoperational and formal operational groups showed a preference for consistency while the concrete stage group did not. The latter did, however, have a preference for positivity - a phenomenon often noted in adult studies of consistency.

The lack of agreement between the Atwood (1969) and Blanchard and Price (1971) studies is not too surprising in light of the differences between their dependent measures. Furthermore, the indirect nature of both methods of measuring consistency (predicting a missing relationship and rating the affective reaction to a triad) appears questionable as a substitute for a child's own cognitive structures. This will be discussed at greater length in the following section.

Carville (1968) did study consistency within an actual classroom setting. He examined Newcomb's statement of consistency in regard to both liking relationships between students and school-related attitudes. Sociometric and attitude questionnaires were administered at the beginning and end of the school year to the fourth, fifth, and sixth graders serving as subjects. Support for the consistency position was found in seven of eight hypotheses dealing with classmate liking relationships. However,

consistency was not supported in regard to school-related attitudes.

To summarize the present section, there are conflicting results regarding the developmental course of consistency. Weir (1960) and Atwood (1969) find evidence that consistency decreases with age. Smith's (1965) work suggests an age related increase. Shaw (1968) found no evidence of change with age while Blanchard and Price (1971) found a decline then an increase in the tendency for consistency. Some of the limitations of the research which have prevented a clearer conception of the developmental course of consistency from emerging will be discussed in the next section.

# Limitations of Developmental Studies of Consistency

While the present section will focus on the recently discussed developmental studies, most of the resulting criticisms apply in equal measure to consistency research in general. Perhaps the most obvious shortcoming has been the limited number of consistency studies of children. Only within the last five years have children younger than high school age been studied. Even the "pioneering" developmental studies by Weir (1960) and Smith (1965) came 15 to 20 years after the first formal statement of consistency. Perhaps the lack of developmental research parallels the research situation in the consistency field as a whole. Kiesler, Collins, and Miller (1968) note that while Heider stimulated a great deal of theorizing about consistency, he

stimulated much less research activity aimed at testing the basic propositions of his theory.

Of that research that has been done a large number of studies have assessed consistency by using hypothetical situations with the subject being asked to either supply a missing relationship or rate the situation for pleasantnessunpleasantness. All three developmental studies of grade school students reviewed earlier employed hypothetical The task of filling in a missing relationship closetriads. ly resembles a "cold" kind of logical reasoning or problem solving rather than the naturally occurring cognitive states which are described by consistency models. Particularly for the school child accustomed to taking tests is it dangerous to assume an isomorphism between predicting a missing bond and a subject's own interpersonal processes. Carville's (1968) study was a welcomed exception to the use of hypothetical situations. Unfortunately, his study measuring the consistency of friendships and school-related attitudes only covered the age span from fourth to sixth grade.

Rating situations for their affective properties as done by the subjects in the Blanchard and Price (1971) study is also questionable. Insko (1967) notes that affective dimensions such as uneasy-pleasant might not be appropriate for describing consistent states. He likens consistency to a stable state and inconsistency to an unstable state. While uneasiness is seen as an acceptable correlate of instability, Insko (1967) argues that pleasantness does not adequately describe stability.

Shortcomings in the way of quantification of both the degree of relationship between elements and the degree of inconsistency of a structure are frequently made of consistency research. (Kiesler, Collins, and Miller, 1969; McGuire, 1966) Quantitative limitations are particularly acute in regard to developmental research where global measures may mask subtle processes of differentiation. Unfortunately, developmental investigators have followed Heider's (1946) lead by viewing a situation as either totally balanced or unbalanced and limiting relationships to likes and dislikes. The quantitative elaborations of consistency theory by Cartwright and Harary (1956), Abelson and Rosenberg (1958) and Osgood and Tannenbaum (1955) make it possible to avoid the criticism of the lack of quantitative sophistication of Heider's original model.

Finally, all of the developmental research surveyed ignored advanced modes of resolving inconsistency. One is left with the impression that everything not accounted for by the simplistic balance model is merely inconsistency "striving" for consistency. More complex ways of resolving inconsistency such as dimensional augumentation (Phillips, 1973) have not been studied developmentally.

# The Present Response to the Limitations of Previous Research

The present study has attempted to avoid many of the shortcomings of developmental studies of consistency just discussed. Many of these limitations will be circumvented

through the study of a consistency model (Phillips, 1973) which is both more quantitatively and theoretically sophisticated than Heider's (1946) original model. Until now, the latter model has been the exclusive concern of developmental consistency researchers.

The quantitative advantages of the Phillips (1973) model make it possible to specify intermediate degrees of relationship between elements as well as an intermediate degree of consistency for a total structure. Consistency research with both adults and children has long been criticized (McGuire, 1966; Kiesler, Collins, and Miller, 1969) for its failure to become more precise in this way.

Even more importantly, however, the Phillips (1973) model conceives of consistency in terms which also allow for "complexity." This is accomplished through the notion of dimensionality whereby consistency at different levels of dimensionality is possible. Previous developmental studies of consistency have ignored such advanced modes of inconsistency resolution.

Another drawback avoided in the present study is the use of hypothetical rating situations criticized by Insko (1967). Subjects will report on the relationship between elements of a given cognitive structure as they perceive them. Thus, a more direct or naturalistic picture of consistency is obtained.

Finally, the situation in which consistency is being assessed will be considered in the present study. Although Smith (1965) alluded to the possible significance

of this variable in regard to consistency, it has not been pursued by later developmental investigators. Perhaps some of the lack of agreement between recent developmental studies of consistency can be explained by situational factors.

# Dimensionality as an Aspect of Cognitive Complexity

Although there is a tendency to think of cognitive complexity as a unitary trait, there is evidence to suggest that such a conception is too simplistic. Vannoy (1965) presented subjects with a battery of 20 instruments purporting to measure complexity. Factor analysis of the intercorrelations of these tests failed to discover a unitary complexity factor. Several factors, all accounting for small proportions of the total variance, were found instead. This led Vannoy (1965) to suggest that "... cognitive complexity may consist of a number of distinct, possibly independent, tendencies not all of which are educed by any of the present measurement instruments." (Vannoy, 1965, p.385)

Bieri (1966) also acknowledges that complexity is not a unitary trait by distinguishing between two main types. The first type views complexity in terms of the number of concepts or categories used by a person. "Such categorical approaches emphasize the discrete, nominal, and classificatory nature of perception, such that the relevant attributes of a stimulus are matched against an ideal model or

precept." (Beiri, 1966 p.28). Bruner's work on concept formation is given as an example of this approach to complexity.

The other approach conceives of complexity in terms of the number of dimensions utilized by a person. This is the type of complexity that was described in Chapter I in relation to the Scott (1969) and Phillips (1973) consistency models.

Research bearing on the development of dimensionality was conducted by Signell (1965) and Olshan (1970). Signell (1965) analyzed the ratings of fourth, sixth, and ninth grade subjects for dimensional complexity in regard to person and nation perception. Dimensional complexity was found to increase in regard to nation but not person perception. However, within concept complexity did increase for person perception.

Olshan (1970) did not find an increase in the number of dimensions utilized by third, sixth, and ninth graders who sorted the traits describing various occupational roles. However, the psychological nature of the two to three dimensions utilized at each grade level did change. Olshan aggregated data at each grade level, however, possibly serving to mask interindividual differences in the development of dimensionality.

The dimensional approach to cognitive complexity has, like consistency theory, received little developmental attention. Differentiation has been demonstrated in a limited way by Signell (1965) in the number of dimensions

and by Olshan (1970) in addition to Signell (1965) within dimensions. Organismic developmental theory provides a further framework for hypothesizing dimensional growth. This view of the developmental process will be reviewed in the following section.

#### Cognitive Differentiation: The Organismic View

As noted in Chapter I, the organismic theories of development as represented by the work of Heinz Werner (1948) and Jean Piaget (1950) have interesting implications for cognitive consistency as a developmental phenomena. Both Werner and Piaget see development as proceeding from a relatively undifferentiated state toward increasing differentiation. At the same time there is a hierarchic integration of former states into the more sophisticated state which has evolved.

Werner (1948) asserts that the process of differentiation and subordination is the basis of organic development. This is felt to be true for biological as well as cognitive development.

> The fundamental law of development which, up to this point, has been demonstrated in the genesis of the nervous system may logically be applied to the mental functions per se. An increasing differentiation and refinement of mental phenomena and functions and a progressive hierarchization may be accepted as a basic principle. (Werner, 1948, p.51)

Werner (1948) advances five pairs of concepts which help to define the course of development discussed above. Thus, he sees such growth as proceeding from (1) syncretic to discrete, (2) diffuse to articulated, (3) indefinite to definite, (4) rigid to flexible, and (5) labile to stable. Werner (1948) provides numerous examples of these progressions in children, primitive tribes, and animals.

Piaget (1950) is more definite than Werner in the stages which undergo differentiation and hierarchization. He describes the process of development from the sensorimotor stage to the stage of formal operations as follows:

> The symbolic schema assimilates sensori-motor schemata with differentiation of function; imitative accommodation is extended into imaginal significants and assimilation determines the significates. The intuitive schema is both a co-ordination and a differentiation of imaginal schemata. The concrete operational schema is a grouping of intuitive schemata, which are promoted, by the very fact of their being grouped, to the rank of reversible operations. Finally, the formal schema is simply a system of second-degree operations, and therefore a grouping operating on concrete groupings. (Piaget, 1950, p.151-152)

As indicated in Chapter I, the question of whether such differentiation occurrs in regard to affect-laden cognition has yet to be answered. Flavell (1963) summarized Piaget's feelings concerning affective development by stating that "Alongside the development of intellectual structures from birth through adolescence are found parallel forms of affective organization, i.e., parallel structures which bear primarily on persons rather than on objects." (Flavell, 1963, p.81)

Some evidence to suggest that there are parallels between intellectual and affective organization can be

found in studies of personality perception. Three of these studies (Gollin, 1958; Biskin, 1971; Peevers and Secord, 1973) are especially relevant because they used the work of Piaget and Werner for making their developmental predictions.

Gollin (1958) studied personality perception in three groups of subjects from 11 to 16 years of age. Subjects were shown a four scene movie of a boy. In two scenes he was shown involved in socially approved behavior while socially disapproved behavior was depicted in the other two scenes. Subjects were then asked to write what they thought of the boy. Responses were scored for the use of both inferences and concepts. Inferences were defined as statements going beyond what was shown in the movie while concepts were attempts to account for the "diversity" of the boy's behavior.

Both inferential and conceptual statements were found to increase with age. Consistent but smaller sex differences favoring girls were found. Even weaker I.Q. and S.E.S. differences were also observed in favor of the subjects higher on each of those variables.

Biskin (1971) used a similar methodology to Gollin but a different dependent measure as subjects at three grade levels (fourth, eighth, and twelfth) were shown two videotaped vignettes showing a boy or girl displaying both socially approved and unacceptable behavior. After seeing a vignette, subjects were asked to write their spontaneous impressions of the central figure. The resulting descrip-

tions were analyzed according to the Crockett system for scoring impressions from contradictory information. Dependent variables measured by this technique include concrete differentiation, abstract differentiation, connectedness, organization, and total differentiation. An increasing differentiation with grade was found on all of these variables. Sex and I.Q. effects favoring girls and brighter subjects were present to a more limited extent.

Peevers and Secord (1973) used open ended descriptions of peers in studying developmental changes in person perception. Groups were examined at the following grade levels: Kindergarten, Third Grade, Seventh Grade, Eleventh Grade and College. They found increasing differentiation with age on the variable of "descriptiveness." This refers to the "relative proportion of information pertaining to a person as a unique individual - the extent to which a person is differentiated from his social setting or possessions." (Peevers and Secord, 1973, p.126) While kindergartners saw the person and his possessions as a global whole, the older subjects differentiated people on such bases as personality traits, unique abilities and interests.

Gollin (1958), Biskin (1971), and Peevers and Secord (1973) provide support for the applicability of organismic theory to "affect-laden" cognition. The present study will attempt to determine whether such support is forthcoming in respect to consistency theory.

#### Summary

Four main areas were reviewed in the present section: consistency research with adult populations, developmental studies of consistency, dimensionality as an aspect of cognitive complexity, and the organismic concept of developmental differentiation. In addition, the two sections dealing with consistency were followed by a critique of research in that area and a statement of how the present study will attempt to overcome the limitations of previous research.

The summary of consistency research with adult populations supports consistency as being an important organizational principle of adult interpersonal and object perception. However, enough shortcomings have been found that classically stated consistency theory is obviously not the last word about such perception. On an intuitive level, the notion that even the most intelligent and flexible among us operate on such a simplistic principle is difficult to accept without qualification.

Developmental studies, like those of adults, have shown that the consistency principle accounts for a good deal of person/object perception. However, developmental trends have not yet been clearly defined. Although not more than five developmental studies could be found by the present investigator, there is support for an increase in consistency with age, a decrease with age, and no developmental change.

Consistency research has been hampered by problems of quantification and a lack of direct measures of cognitive structure. Furthermore, the small number of developmental studies have examined consistency only in light of Heider's original statement of the theory. Elaborations of the consistency position which allow for considerably more quantitative sophistication have been ignored. A dimensional approach to consistency as found in the work of Scott (1968) and Phillips (1973) is one such promising elaboration for developmentalists to pursue.

Dimensionality as an aspect of cognitive complexity was also reviewed in the present section. Although there has been little developmental study of this type of complexity, tendencies toward both growth in the number of dimensions and between dimensions have been noted.

Finally, the concept of "differentiation" as advanced by Werner and Piaget was presented. This provides a framework in which to hypothesize an increase in dimensionality with development. At the same time, the use of an unidimensional or traditional consistency model would be expected to decline. Three studies reviewed in the area of personality impression from inconsistent information have verified the existence of differentiation in that realm. Thus, differentiation in the area of consistency, while not yet unequivocally demonstrated, is a distinct possibility.

# CHAPTER III

# METHODOLOGY

## Sample

The sample consisted of groups of 3rd., 7th., and 11th. grade students drawn from a school district in a mixed farming-industrial-college town in southern Michigan. The 3rd. graders represented all three of the district's elementary schools while the 7th. and 11th. graders attended a centralized Middle School and Senior High School respectively. Each grade level group was composed of a total of 24 students who were further subdivided on the basis of intelligence and sex. The experimental design is illustrated in Table 1.

# Table 1. Experimental Design

	GRADE						
	3		7		11		
	SEX						
	м	F	м	F	м	F	
A High	6	6	6	6	6	6	
H LOW	6	6	6	6	6	6	

#### Sample Selection

Sampling at each grade level was done on a random basis within the confines of intelligence range. The following score ranges were selected for defining the High and Low intelligence groups:

High 105-120

# Low 80-95

I.Q. scores were obtained from school records. At each grade level included in the present study the California Achievement Test battery had been administered the previous fall. The language score from the Mental Maturity section of this instrument was used as the intelligence criterion.

In order to compensate for some of the unreliability of group test scores, those 7th. and 11th. graders whose present scores fell in the High range but scored below 100 when tested two years ago were eliminated from the sample. Similarly, those presently scoring in the Low group who scored above 100 two years ago were also eliminated. Such a comparison was not possible with the 3rd. grade group as no comparable previous results were available for them. The intelligence test score means for each group included in the study is contained in Table 2.

An additional restriction placed upon the sample was that all students selected be within one year of the expected chronological age for their grade level. This restriction was necessary to prevent the Low I.Q. groups from being significantly older than expected for their

grade level. This would have been likely because of the frequent occurrance of school failure within those groups. The mean age for each group is presented in Table 3.

Table 2. Mean I.Q. scores of the sample.

	GRADE							
	3		7		11			
		SEX						
	м	F	М	F	M	F		
a High	111.66	111.66	113.33	111.50	112.00	110.83		
H Low	90.16	88.66	88.33	90.16	86.00	87.00		

Table 3. Mean ages of the sample.

	GRADE						
	3		7		11		
	SEX						
	м	F	м	F	м	F	
ở High	9-1	8-11	13-1	13-3	16-11	17-0	
H Low	9-1	9-3	13-4	13-4	17-1	17-3	

#### Procedure and Test Stimuli

The <u>S</u>s were seen individually at school by the examiner and tested in an office or small room. Upon meeting the <u>S</u> the <u>E</u> introduced himself as a student from Michigan State University. The <u>S</u> was then told that he or she had been chosen by chance to participate in a study concerning how students their age feel about a number of subjects. The <u>S</u> was then asked if he would like to spend about one half hour filling out some sheets. All <u>Ss</u> agreed to do so. Specific test instructions are contained in Appendix A.

The test materials consisted of three separate topics which contained seven items each. Using Abelson and Rosenberg's (1958) terminology such a topic would be referred to as a "conceptual arena" and its component items known as "cognitive elements." The three conceptual arenas constructed for the present study were labeled "People I Know," "School," and "Occupations." The elements contained in each of these topics were the following:

#### PEOPLE I KNOW

I (subject) Dad (or closest male relation) Mom (or closest female relation) First Liked Person First Disliked Person Second Liked Person Second Disliked Person

#### SCHOOL

I (subject) Teacher Principal Lunch Time Homework Friends Tests

#### OCCUPATIONS

I (subject) Farmer Dentist Policeman Factory Worker Teacher Janitor Each cognitive element was typed on a separate 3x5 card. A rating sheet (Appendix B) was placed before the <u>S</u> prior to presenting the elements for each conceptual arena. The cards for a given arena were presented two at a time by hand by the <u>E</u>. The <u>S</u>s were asked to rate how well the pairs "go together" with one another. For each topic, a total of 21 pairwise relationships was generated by its 7 elements.

A two step rating procedure was employed. The rating sheet was divided into two halves for this purpose. The first step involved the <u>S</u> marking whether each pair of elements was positive (+), negative (-), or neutral (0) with one another. While these initial ratings were made the rating sheet was folded so that only the left half of the paper containing spaces numbered from 1 to 21 was exposed. The appropriate sign for each relationship was marked by the <u>S</u> in these spaces.

After this initial rating was made for the elements of a conceptual arena, the rating sheet was completely opened to expose the numbers 1 through 5 for rating the intensity of the previously identified positive and negative relationships. All pairs of elements identified as positively related were first re-exposed and intensity ratings made by the  $\underline{S}$  who circled the number corresponding to the degree of relationship for a given pair. Negatively rated relationships were then similarly re-exposed and rated for intensity.

After one topic was completely rated, the same

procedure was followed for rating the two succeeding topics. The presentation of the three topics was systematically varied to control for order effects.

Before ratings were given for People I Know,  $\underline{S}s$ were asked to give the first names of two people outside of their family that they liked and two that they disliked. These names were then printed on 3x5 cards and presented with the other elements for that topic.

The three conceptual arenas and their cognitive elements were constructed with two criteria in mind. The first was that they be meaningful to all groups represented in the present study. Secondly, the topics were constructed to represent a continuum of ego-involving situations. People I Know was thought to represent a highly involving topic while Occupations was selected for its seemingly low involvement. School was felt to represent an intermediate degree of involvement.

# Hypotheses

Before stating the hypotheses, a bridge between the literature reviewed in Chapter II and the present measure of dimensionality would be useful. The literature reviewed suggests that there is a large but not perfect tendency toward consistency in organizing interpersonal and object perception. Furthermore, there is no unambiguous evidence from adult or child studies to suggest differences between groups in the tendency or "need" for con-

sistency. Thus, consistency may be thought of as a constant across groups.

This has important implications for the eigenvalue measure of dimensionality used in the present study. This index is sensitive to both consistency and dimensionality. Assuming that the tendency toward consistency is a constant, changes in this index would be due to dimensionality which would be expected to increase on the basis of organismic theory. Thus, while the present measure does not enable one to label with complete certainty a given subject's level of dimensionality, it does permit meaningful between group comparisons.

Hypothesis I. As grade increases a Rank I matrix (one dimensional) will account for smaller amounts of the total matrix variance.

This hypothesis is based on the belief that consistency theory in its traditional form represents a global, undifferentiated state. Thus, the organismic process of differentiation should result in the simplistic model accounting for less variance with development.

Hypothesis II. As grade increases there will be an increase in the number of dimensions used to achieve consistency.

Although the first hypothesis suggests an age-related decline in consistency in the traditional sense, it can be seen from the present hypothesis that the consistency position is not being completely abandoned. Rather, it is

expected that older subjects maintain consistency at a higher level of dimensionality.

Hypothesis III. The number of dimensions utilized by subjects will be greater at the higher I.Q. levels.

Based on the .70 correlation between Piagetian and Stanford-Binet test scores (Kohlberg, 1968) I.Q. would be expected to be an important factor determining dimensional development. This would be especially true at the seventh grade level where Piaget's stage of Formal Operations has, on the average, just evolved out of Concrete Operations.

Hypothesis IV. The number of dimensions used by subjects will vary across the three topics presented.

This hypothesis is based on the observation that even the acquisition of Piagetian tasks such as the conservation of matter, weight, and volume are not achieved at the same time. (Flavell, 1963) Thus, a difference in dimensional development in regard to different topics appears plausible. Such a difference across topics may also explain the lack of agreement between past developmental studies of consistency theory.

In addition to the above hypotheses the variable of sex will also be examined. However, since previous consistency studies have not found sex to be a significant variable, no specific hypothesis is made concerning it.

#### CHAPTER IV

#### ANALYSES AND RESULTS

# Introduction

The research hypotheses were tested using two multivariate analyses of repeated measures. The first multivariate analysis was used to test only the initial hypothesis. The dependent measure in this case was an estimate of the total variance for each matrix accounted for by a Rank I model - the traditional unidimensional model of consistency. Each of the 216 matrices generated by the 72 Ss was factored according to the Rank I model using a Computer Institute for Social Science Research program on the Michigan State University 6500 computer. Eigenvectors and eigenvalues were calculated for each matrix by this pro-The largest of the seven matrix eigenvalues was gram. then squared and divided by the sum of squares of all seven eigenvalues to obtain an estimate of the total matrix variance accounted for by the Rank I model.

In order to test hypotheses two to four a second multivariate analysis of repeated measures was used. The dependent measure for this analysis was a number describing subject dimensionality for each of the three topics. This measure was obtained by factoring each matrix using Rank II

through Rank VII models in addition to the Rank I model previously generated. Estimates of matrix variance accounted for by each model were then calculated by adding the sum of squares of the <u>n</u> largest eigenvalues corresponding to the rank of the model being tested and dividing by the total sum of squares of all seven eigenvalues. Dimensionality was defined from these variance estimates as the model of lowest rank which accounted for at least 75 percent of the total variance for a given matrix. When the 75 percent level could not be reached by any model for a given matrix, the rank of the model most closely approximating this criterion determined dimensionality for that matrix.

The 75 percent criteria provides an intermediate degree of variance accounted for which is neither unrealistically high nor low. Furthermore, this criterion orders the data in much the same way as 70 percent or 80 percent levels.

A criterion much lower or higher than the one chosen would have resulted in either a basal or ceiling effect. That is, a lower criterion in the 50-60 percent range would have made virtually all subjects appear unidimensional. By contrast, a 90 percent criterion would have resulted in most subjects appearing highly multidimensional. In both cases, the between subject variance would have been greatly restricted when compared to the 75 percent criterion.

The variance accounted for by each model and the derived dimensionality for each matrix are presented in

Appendix C.

The results of the multivariate analyses of repeated measures are presented in Tables 4 and 5. The absence of significant interactions for each multivariate analysis permits a direct interpretation of hypothesized main effects. The .05 significance level was used to evaluate hypothesized effects.

Table 4. Multivariate analysis of variance of repeated measures for matrix variance estimates using a Rank I model.

Source	F	df	<u>P &lt;</u>
Between Subjects			
Grade	1.1241	6,116	.3527
IQ	.7864	3, 58	.5064
Sex	.7242	<b>3,</b> 58	.5417
Grade x IQ	.7560	6,116	.6060
Grade <b>x</b> Sex	.6036	6,116	.7270
IQ x Sex	.5578	3, 58	.6451
Grade x IQ x Sex	.8383	6,116	.5428
Within Subjects			
Topic	47.9322	2, 59	.0001
Grade x Topic	1.3470	4,118	.2567
IQ x Topic	.6401	2, 59	.5309
Sex x Topic	1.0190	2, 59	.3673
Grade x IQ x Topic	.5269	4,118	.7162
Grade x Sex x Topic	.8088	4,118	.5220
IQ x Sex x Topic	.6108	2, 59	.5464
Grade x IQ x Sex x Topi	c .7559	4,118	.5561

Source	<u>F</u>	df	<u>P &lt;</u>
Between Subjects			
Grade	1.7694	6,116	.1114
IQ	1.5234	3, 58	.2181
Sex	.9863	3, 58	.4057
Grade x IQ	.4998	6,116	.8075
Grad <b>e x S</b> e <b>x</b>	.4899	6,116	.8149
IQ x Sex	.8797	3, 58	.4571
Grade x IQ x Sex	.9345	6,116	.4732
Within subjects			
Topic	32.6137	2, 59	.0001
Grade x Topic	1.4728	4,118	.2149
IQ x Topic	.4578	2, 59	.6350
Sex x Topic	.6003	2, 59	.5520
Grade x IQ x Topic	.5878	4,118	.6721
Grade x Sex x Topic	.7173	4,118	.5818
IQ x Sex x Topic	.9435	2, 59	.3951
Grade x IQ x Sex x Topic	.7184	4,118	.5810

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Table 5. Multivariate analysis of variance of repeated measures for dimensionality.

Hypothesis I. As grade increases a Rank I matrix (one dimensional) will account for smaller amounts of the total matrix variance.

The obtained F ratio of 1.12 (df=6,116;p $\langle$ .3527) fails to support this hypothesis. On the first topic, People I Know, there was slightly more variance accounted for at the seventh (74 percent) and eleventh (71 percent) grades than at the third grade (66 percent) by the Rank I model. The second topic, School, showed virtually no grade-related change as it accounted for 58 percent, 54 percent, and 57 percent of the variance across grade. The third topic, Occupations, showed a slight increase from 46 percent to 48 percent to 49 percent as grade increased.

Hypothesis II. As grade increases there will be an increase in the number of dimensions used to achieve consistency.

The nonsignificant F of 1.7694 (df=6,116;p $\lt$ .1114) fails to provide support for this hypothesis. Seventh and eleventh graders had almost identical mean dimensionalities across all three topics of 2.52 and 2.54 while third graders had a somewhat higher mean dimensionality of 2.81.

Hypothesis III. The number of dimensions used by subjects will be greater at the higher I.Q. levels.

The obtained F ratio of 1.5234 (df=3,58;p<.2181) also fails to provide support for this prediction. Furthermore, low I.Q. subjects were found to have a higher mean dimensionality (2.78) than high I.Q. subjects (2.47).

Hypothesis IV. The number of dimensions used by subjects will vary across the three topics presented.

The obtained F ratio of 32.6137 (df=2,59;p<.0001) supports the hypothesized difference in dimensionality across topics. In order to determine whether there were differences between all possible pairs of topics the univariate analyses of differences between topics were examined. As can be seen in Table 6 all three possible comparisons were significant at the .0001 level.

Table 6. Univariate analyses of variance for comparisons between topics.

Comparison	Mean Square	<u> </u>	df	P<
Topic 1-Topic 2	18.0625	21.6389	1,60	.0001
Topic 1-Topic 3	72.2500	65.6818	1,60	.0001
Topic 2-Topic 3	18,0625	18.0374	1,60	.0001

As illustrated by Figure 1 the differences between subjects on each of the three topics were in the direction of increased dimensionality as ego-involvement decreased. The most involving topic-People I Know-had a mean dimensionality of 1.917 while average dimensionalities of 2.625 and 3.333 were obtained for "School" and "Occupations" respectively.



Figure 1 Average number of dimensions utilized by subjects on each of the three topics.

In addition to the preceding hypotheses sex was examined as a variable possibly affecting dimensionality. The nonsignificant F ratio of .9863 (df=3,58;p<.4057) fails to provide support for sex effects in regard to dimensionality. A higher overall mean dimensionality of 2.73 was found for girls as compared to a mean dimensionality of 2.52 for boys.

#### Summary of the Results

Hypotheses concerning differences in the amount of variance accounted for by a Rank I matrix and differences in dimensionality across grade and I.Q. level were not supported. Sex differences were also examined and failed to yield a significant difference in subject dimensionality. The nonsignificant mean differences pointed toward higher dimensionality for third grade subjects, low I.Q. subjects, and girls.

A highly significant difference (p<.0001) was found, however, across topics. All possible comparisons between the three topics were found to be significantly different in the dimensionality utilized by subjects on each. Lowest dimensionality was found in the highly ego-involving People I Know topic while the dimensionality of subjects increased on School and, to an even greater extent, on Occupations.

#### CHAPTER V

#### DISCUSSION OF THE RESULTS

The results presented in Chapter IV will be discussed under three main headings. First, findings relating to the unidimensional model of consistency will be considered. Following that will be a discussion of dimensionality with respect to grade, I.Q., and sex. All three of these variables were found to be nonsignificant in regard to dimensionality. Finally, an attempt will be made to explain the highly significant differences due to topic.

#### The Unidimensional Model of Consistency

The unidimensional model represents the traditional view of consistency. This view implies that we separate our likes and dislikes into two distinct camps. We expect that there will be positive relationships between those things that we like and a similar relationship between our dislikes. Furthermore, we expect our "likes" to be opposed to our "dislikes" and vice versa.

It was hypothesized that the organismic process of differentiation would result in this "simplistic" model of consistency accounting for less matrix variance as
age increased. The results did not support this prediction as nonsignificant differences were found between the three grade level groups for each of the three topics.

The present results are in agreement with Shaw (1968) who also failed to observe developmental change in the tendency to seek consistency. Other developmental studies fail to provide consistent evidence of an agerelated differentiation of the global state of unidimensional consistency. Thus, the usefulness of organismic theory to help describe development in this area appears limited. Perhaps as Flavell (1963) asked, there is "...a development toward nonverdicality contemporaneous with the Piagetian development away from it." (Flavell, 1963, p.441)

The amount of variance accounted for by the unidimensional model no doubt explains its persistence as the most common form of consistency from Heider's (1946) original presentation to the present day. Averaging across all groups one dimension accounted for 70 percent of the estimated matrix variance on the first topic, 56 percent on the second topic, and 48 percent on the third topic. Such explanatory power is rarely equaled in personality or social psychology research. Thus, the fact that consistency accounts for a good deal of person and object perception has been demonstrated once again by the present study.

# Dimensionality in Respect to Grade, I.Q., and Sex

In light of the lack of an age-related decrease in the variance accounted for by the unidimensional model, it is not surprising that developmental differences in dimensionality were not found. Again, the "semicognitive" processes involved in consistency have apparently operated to negate whatever developmental change has occurred.

However, the mean dimensionality across all subjects and topics (X=2.625) indicates that increased explanatory power is added by the multidimensional model. Even the topic generating the lowest mean dimensionality-People I Know (X=1.917)- is better explained by a multidimensional than unidimensional model. These findings are consistent with Olshan (1970) who also found that two to three dimensions were utilized at all age levels sampled with no increase in dimensionality with age. Olshan (1970) arrived at her results with data aggregated at each grade level. The present study supports her findings with individually determined dimensionality.

Thus, despite the previously acknowledged power of the unidimensional model, the multidimensional model of Phillips (1973) accounts for even more of the present data. Further use of the multidimensional model for describing consistency appears warranted on the basis of the present results.

The question concerning why dimensional growth was not observed at the more advanced developmental levels

remains to be considered. The most obvious answer to this question has been alluded to already. That is, dimensional augumentation may not conform to organismic processes of differentiation. While some types of cognitive complexity have been shown to undergo age-related differentiation, these studies (Gollin, 1958; Biskin, 1970) have focused on aspects of complexity other than dimensionality. Vannoy (1965) gives good reason to believe that complexity is not a unitary trait. Thus, there is the possibility that different aspects of complexity have different developmental courses.

Methodologically, dimensional augumentation may have been masked for a couple of reasons. One possibility in this regard was a failure to extend the age range sampled low enough. At the lowest level, third grade, at least two dimensions were already firmly established. A third grade group was also the youngest used by Olshan (1970) when she failed to find dimensional growth. Perhaps the point at which a change from a one to two dimensional cognitive structure occurs is several years earlier.

Another methodological consideration possibly affecting dimensional growth concerns the use of multidimensional scaling. Peevers and Secord (1973) criticized Olshan (1970) for her use of such a technique in attempting to study dimensionality. Instead, they suggest that open ended techniques would be more sensitive to developmental changes.

Finally, the failure to discover dimensional growth

may be due to the inadequacy of the assumption that the "need" for consistency is constant across groups. Based on the literature surveyed this appeared reasonable to assume. If the tendency toward consistency does change with age, however, its effect in the present study would be to offset possible increases in dimensionality. This would have occurred because the eigenvalue index employed to define dimensionality is sensitive to consistency as well as dimensionality.

A recent study by Peevers and Secord (1973) did find that third and seventh graders were more consistent than kindergarten students although this trend was reversed by eleventh graders. Despite this reversal effect at the eleventh grade level, this does suggest that there may be differences between groups in the need for consistency. Intuitively, the pressures to conform and be accepted by the peer group at the junior high school level may well be operating to increase seventh graders' conformity to consistency. Such a development could be obscuring concurrent dimensional augumentation in the present study.

### Dimensionality in Respect to Topic

Highly significant differences (p<.0001) were found on subject dimensionality for each of the three topics. A mean dimensionality of 1.917 was generated across all subjects for People I Know, 2.625 for School, and 3.333 for Occupations. Furthermore, the correlations between topics were low. Correlations of -.11 were found between People

I Know and School, .08 between People I Know and Occupations, and .27 between School and Occupations. This clearly suggests that a person's dimensional consistency is not constant across all situations.

This lack of cross-situational stability is not surprising in light of Vannoy's (1965) similar findings for cognitive complexity. Furthermore, personality traits are generally found to have low cross-situational stability. As consistency falls on the continuum between purely affective and purely cognitive traits, it would be expected to show moderate stability at best.

Bieri (1966) stressed the importance of the dimensionality of the stimulus as well as the response in determining the number of dimensions a person uses in making a given judgment. This approach is in contrast to the response centered orientation of Piaget's developmental theory.

> ... if we wish to predict differences between cognitively complex and simple subjects on a given task, we think it is of value if the task itself can be analyzed in terms equivalent to those used in conceptualizing the variable of cognitive complexity. One result of this kind of coordinate analysis is that we begin to think of our structural variable as a more specific cognitive ability, rather than as a general trait that will express itself in any given segment of social behavior. Because cognitive complexity subsumes the ability of a person to differentiate among a number of dimensions of social behavior, we would apply our stimulus analysis in terms of the dimensional qualities of the input with which the person is asked to deal. (Bieri, 1966, p.17-18)

Such an approach may help to explain the differences in dimensionality between the three topics in the present

study. The topic receiving the lowest mean dimensionality, People I Know, consisted only of real people well known to the subject. Thus, only interpersonal dimensions would be relevant when making these ratings. The topic ranking second in dimensionality, School, contained both people known to the subject and activities commonly engaged in by the subject. Thus, dimensions not relevant to the first topic could be brought into play by the more diverse elements in this situation.

The topic with the highest dimensionality-Occupations-consists of hypothetical people and represents a somewhat abstract rating situation compared to the other two topics. In this situation the subject is not bound by reality to use a limited number of dimensions. Thus, he may make more use of all the dimensions available to him.

The phenomenon of positivity provides another basis for explaining the present differences between topics. The literature review showed that the greater the number of positive bonds within a series of relationships the more that situation would conform to the traditional consistency model.

Price, Harburg, and Newcomb (1966) enlarged upon these findings to stress the importance of engagement in determining degree of consistency. High engagement is present when there is a positive P-O bond in a P-O-X triad. This implies that there is more interaction or involvement between the elements in such a situation. In a triad

with a negative P-O bond uncertainity and ambivalence serve to diminish involvement.

In the present study positivity and engagement appear greatest in the People I Know situation. Here there are generally strong positive bonds between the subject and four (Father, Mother, Two Liked Persons) of the six remaining elements. For School, positivity decreases as "My Friends" is the only strongly positive element. "Principal," "Teacher," and "Lunch Time" were usually positive but not as highly polarized as the positive elements of People I Know. In Occupations none of the hypothetical people serving as elements were perceived as overwhelmingly positive by the subjects. Thus, little positivity and low engagement describes this topic.

In line with the research on positivity, People I Know conforms most closely to the traditional consistency model. As positivity and engagement decrease with School and Occupations there is further departure from the one dimensional model.

The present results bear some similarity to those of Carville (1968) who found strong support for consistency in upper-elementary students in regard to attraction to classmates but not for school-related attitudes. He theorized that his results were due to the greater importance and relevance attached to friendship choices as opposed to school-related attitudes.

The combination and interaction of positivity/engagement with stimulus dimensionality may well account for much

of the differences between topics on the amount of variance accounted for by the unidimensional model as well as differences in mean dimensionaltiy. High engagement may well imply low stimulus dimensionality and vice versa. If positivity does result in a more effective unidimensional model, then there is less data to be accounted for by extra dimensions. Similarly, low engagement and high dimensionality appear to be compatible. In this case the lessened power of the traditional model implies that additional dimensions can account for more variance.

Another possible explanation for the observed differences in dimensionality across topics may be attributed to the differential reinforcement contingencies which operate in regard to different situations. For instance, parents may reinforce children for displaying low dimensionality in interpersonal situations such as People I Know while reinforcing a more multidimensional outlook in regard to an abstract topic like Occupations. Also, the level of dimensionality that parents "model" in different situations is likely to influence children to adopt similar levels of dimensionality in analogous situations.

### Summary of the Discussion

The strength of the unidimensional or traditional model of consistency was not found to decline with age in the present study. As in previous studies, such a model was able to account for a significant amount of data, thus,

explaining its popularity.

Developmental differences in dimensionality were not found for the variables of grade, I.Q., and sex. Despite this failure, the multidimensional model of consistency was found to be more effective than the traditional model in accounting for the present data. Confirming the results of Olshan (1970), two to three dimensions were utilized at all age levels. Thus, the multidimensional consistency model of Phillips (1973) merits further attention.

The highly significant differences generated by the three topics was explained on the basis of stimulus dimensionality and positivity. Low stimulus dimensionality and high positivity appear compatible with one another as in the People I Know situation which generated the lowest dimensionality in the present study. Similarly, high stimulus dimensionality and little positivity lead to higher dimensionality as demonstrated by subjects on the Occupations topic. An alternative explanation of differences in dimensionality was offered in the form of the reinforcement contingencies and adult modeling operating in regard to different topics.

#### CHAPTER VI

### SUMMARY, IMPLICATIONS, AND LIMITATIONS

### Summary

A model of cognitive consistency which is sensitive to both consistency and complexity was studied from a developmental perspective. This model (Phillips, 1973) is concerned with the number of dimensions a person uses to maintain consistency. Thus, the traditional (one dimensional) as well as a complex, multidimensional view of consistency can be accommodated.

Previous developmental studies of consistency have not elucidated clear developmental trends. Furthermore, only the basic one dimensional balance model of consistency has been examined. The organismic concept of differentiation was used as a basis for predicting dimensional augumentation at higher developmental levels.

A total of 72 subjects were divided equally into groups on the basis of grade (Third, Seventh, Eleventh), I.Q. (High, Low), and sex. Consistency was measured in regard to three topics: People I Know, School, and Occupations.

Each topic resulted in data in the form of a matrix which was factored according to Rank models from I to VII.

Dimensionality was determined by the model of lowest rank which reached the criterion of accounting for 75 percent of the estimated matrix variance.

Age, I.Q., and sex were found to be nonsignificant in regard to dimensionality. Also contrary to prediction, a one dimensional model was not found to account for less matrix variance with age. However, topic was found to be highly significant in generating different levels of dimensionality. Mean dimensionality increased from 1.92 in repect to People I Know to 2.63 for School and 3.33 for Occupations. Approximately two to three dimensions were employed by subjects at all levels despite the failure to detect dimensional augumentation.

These findings were discussed and the implications as well as the limitations of the present study will now be considered.

### Implications of the Present Study

The present study has implications for both cognitive consistency theory and the field of education. Implications for consistency theory will be considered first, the most obvious being that the present study has highlighted the importance of situational factors in regard to consistency. Smith (1965) recognized the importance of these factors when discussing the discrepancy in results between his and Weir's (1960) developmental studies. However, later investigators have not closely pursued this variable. Whenever consistency

researchers have studied situational factors they have generally manipulated the relationships within a constant situation.

This is in contrast to the present study where consistency was assessed in different situations. Further attention to situational factors is indicated by the strong effects topic had in generating different levels of dimensionality in the present study.

Another implication of this study is that the multidimensional model (Phillips, 1973) represents a considerable improvement over the traditional conception of consistency. By allowing for both consistency and complexity, this model is very attractive theoretically. The present study found that as early as third grade two to three dimensions are needed to account for interpersonal and object perception. Thus, the theoretical advantages of the multidimensional view are complemented by its increased ability to account for the present data.

Hopefully, future studies will refine this model further and demonstrate its ability to account for a wider variety of consistency and complexity phenomena. On the basis of the present study, further use of the multidimensional model certainly appears justified.

Educational implications of the present study will now be considered. It was argued in an earlier chapter that if dimensional augumentation with age could be demonstrated, then attempting to foster such growth would be a valid goal of education. Since such an increase was not found and two

to three dimensions were present in even the youngest group, the need to generally stimulate growth in the number of dimensions does not appear pressing.

The present study did demonstrate, however, that in regard to a highly ego involving situation such as People I Know students at all levels are not as highly dimensional as they are in less involving situations. Thus, students may be encouraged in such situations to use more of the dimensions available to them.

Teachers could stimulate the use of more dimensions in regard to highly interpersonal situations in several ways. Teacher modeling and exposure to people and literature displaying higher degrees of dimensionality may help to stimulate such development. Teachers could also reinforce students for displaying higher levels of dimensionality in their interpersonal relationships as well as making students aware of their use of mechanisms such as rationalization and denial which are used when judgments are made to fit on a limited number of dimensions.

A final implication of the present study concerns the need for more study of development in affective areas during the school years. The present study indicates that the organismic model does not operate as neatly in respect to an affect-laden area such as consistency as for more purely cognitive development. Further developmental studies of semicognitive processes would aid in the development of approaches for fostering their positive development. The current interest in preventive mental health is resulting

in a number of classroom approaches for stimulating positive emotional development. However, unless a clearer delineation of affective development during the school years is made, these efforts may well be misguided. In the next section some direct implications of the present study for future research will be mentioned.

### Implications for Future Research

The present study suggests at least two very important considerations for future research. While differentiation was not found in regard to the number of dimensions, it is possible that organismic theory would have fared better in regard to <u>within</u> dimension development. As mentioned earlier, Olshan (1970) discovered changes within dimensions in the absence of dimensional augmentation. Similarly, Signell (1966) found within dimension development in regard to person perception. Thus, the present results are somewhat incomplete in providing a test of dimensional differentiation. Further studies which examine the dimensional approach to consistency in regard to both growth in the number of dimensions and within dimensions are needed.

The other major direction for research suggested by the present study concerns the relationship between the overall "need" for consistency and dimensionality. In the preceding chapter it was noted that the assumption made in the present study of a constant need for consistency across age groups may be inadequate. Future research with the

dimensional model of consistency would do well to employ independent measures of consistency and complexity to determine the amount of age-related change due to each of these factors.

### Limitations

One limitation of the present study mentioned during the course of the discussion was the failure to extend the age range sampled low enough. Thus, possible dimensional augmentation occurring before the third grade could not be detected.

To remedy this shortcoming, however, would necessitate considerable changes in methodology to accommodate a younger age group. The present rating procedure, for instance, would not have been useable as even some third graders required considerable repetition before understanding its use. In addition, as age span increased, it would have become increasingly difficult to devise a set of common cognitive elements relevant to all groups.

The sample utilized limits the generalizations that can be made concerning the present results. The students studied were drawn from schools in a small, generally conservative community. No blacks, Mexican-Americans, or American Indians were included in the sample. While the present sample is fairly representative of small towns in the Midwest, it cannot be assumed that identical findings would have resulted if the sample had been drawn from an inner-

city black or liberal white community.

It is possible, for instance, that in different environments there is different reinforcement from parents and peers for displaying various levels of dimensionality. Furthermore, the three topics used in the present study may have a very different meaning for children from various backgrounds.

The criticism of multidimensional scaling made by Peevers and Secord (1973) in regard to Olshan's (1970) study also applies to the present work. They feel that such a technique may not be sensitive enough to dimensional change since it is designed to achieve parsimony in a set of descriptions. Open ended techniques are seen to be preferable by Peevers and Secord (1973).

While the method of factoring matrices according to various ranks or dimensional models provides an easily obtained estimate of the matrix variance accounted for by a given model, further work is needed concerning the mathematical properties of such matrices. Measures of the necessary amount of change in variance generated by an additional rank to account for a psychologically meaningful dimension would be especially helpful.

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APPENDICES

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### APPENDIX A

### RELATIONSHIP RATING INSTRUCTIONS

"The reason I wanted to see you today, \_\_\_\_, is because I want to find out how \_\_\_\_ graders feel about a number of things. I will be asking you to mark how well certain things go together but this is not a test because the only right answers are what you really think."

"I am going to show you cards with the names of either people or things on them. Each time I will show you the cards two at a time. On your paper here (Rating Sheet Presented) I want you to mark whether the two things either go together, do not go together, or have no relation to one another. I will explain this some more by giving you some examples."

"If you think that two things go together you mark a plus (+) on your paper. Here are some examples of things that gotogether:

(Sample Cards Presented)

### Tom-Baseball

Tom is on the baseball team and since he likes to play the game we would mark a plus (+) on our paper between Tom and baseball. Here's another one:

### Seed-Flower

A seed and flower go together because one follows from the other so we would put another plus (+) on our paper."

"When two things do not go together you mark a minus (-) on your paper. Here are some examples on things

that do not go together:

#### Mary-Sue

Mary and Sue are two girls who do not get along with one another so we would mark a minus (-) between them on our paper. Here's another example of two things that do not go together:

#### Weeds-Flowers

Since weeds often stop flowers from growing they would not go together and we would mark a minus (-) on our paper between weeds and flowers."

"If you cannot decide or do not think that two things are either for or against one another then you mark a zero (0) on your paper between them."

The 3x5 cards containing the elements for the first topic were then presented in all possible pairs and rated by the <u>S</u>. After the initial ratings of positive, minus, and neutral were made for the first topic the <u>S</u> was then told the following concerning the numerical rating procedure:

"I am now going to show you all the pairs of cards that you marked plus (+) because you thought that they go together. I want you to tell how much you think they go together by circling a number from one to five on your paper. The higher the number you circle means the more you think they go together. A low number like a l or 2 means two things go together a little bit. A 3 means they go together some more. If you think they go together quite a bit you would mark a 4 or a 5 if they go together a lot. Do you have any questions about how you are supposed to use these numbers?"

The preceding paragraph was then repeated substituting "do not go together" rather than "go together" for rating the intensity of the negative relationships.

After the first topic was completed, a second rating sheet was presented and the <u>S</u> told:

"Now I have another set of cards to show you. Remember, if two things go together you mark a plus and if they do not go together you mark a minus. A zero means you can't decide or they are not for or against one another."

After the initial ratings were made, the numerical rating instructions were repeated. Upon the completion of the second topic, the last topic was presented in a similar manner to the second.

### APPENDIX B

### RATING SCALE

1	1	2	3	4	5
2	1	2	3	4	5
3	1	2	3	4	5
4	1	2	3	4	5
5	1	2	3	4	5
6	1	2	3	4	5
7	1	2	3	4	5
8	1	2	3	4	5
9	1	2	3	4	5
10	1	2	3	4	5
11	1	2	3	4	5
12	1	2	3	4	5
13	1	2	3	4	5
14	1	2	3	4	5
15	1	2	3	4	5
16	1	2	3	4	5
17	1	2	3	4	5
18	1	2	3	4	5
19	1	2	3	4	5
20	1	2	3	4	5
21	1	2	3	4	5

### APPENDIX C

## VARIANCE ESTIMATES GENERATED BY EACH MATRIX RANK MODEL FOR EACH SUBJECT BY TOPIC

\* Model resulting in derived dimensionality

Topic:

l=People I Know
2=School
3=Occupations

 $\underline{S01-S06}$ : Third Grade, Low I.Q., Boys  $\underline{S07-S12}$ : Third Grade, Low I.Q., Girls

<u>s</u>	Topic	<u> </u>	2	3	4	5	6	7
01	1 2 3	.709 .640 .303	•795* •792* •525	.841 .821 .643	.850 .701	.747*		
02	1 2 3	.836* .438 .330	.877 .614 .601	.721 .677	.772* .726	•776*		
03	1 2 3	•708 •459 •453	•809* •720 •678	.836 .795* .788*	.830 .810	.845		
04	1 2 3	.687 .601 .790*	•788* •705 •836	.831 .754* .872	.867 .802			
05	1 2 3	.654 .243 .484	.751* .474 .648	.802 .684 .733	•739* •795*			
06	1 2 3	.542 .659 .616	.704 .763* .773*	.758* .814 .825	.808 .850			
07	1 2 3	.581 .693 .327	.703 .816* .592	.769* .688	.817 .763*			
08	1 2 3	.497 .586 .286	.688 .741 .539	•784* •798* •698	.827 .760*			
09	1 2 3	.614 .474 .509	.735 .670 .722	.843* .748 .846*	.875 .790* .890	.921		
10	1 2 3	.662 .568 .437	.771* .779* .705	.829 .828 .791*	.821			
11	1 2 3	.545 .408 .379	.696 .651 .569	.766* .757* .677	.786 .792 .740	.829 .836 .779*		
12	1 2 3	.694 .608 .346	•808* •753* •450	.837 .809 .615	.868 .841 .692	.737*		

S13-S18: Third Grade, High I.Q., Boys  $\overline{S19}-\overline{S24}$ : Third Grade, High I.Q., Girls

<u>s</u>	Topic	1	2	3	4	5	6	7
13	1 2 3	.624 .517 .247	•755* •699 •450	.841 .821* .643	.832 .828 .649	.867 .721*		
14	1 2 3	.516 .895* .673	.742 .764*	.786* .813	.827			
15	1 2 3	.709 .416 .376	.804* .608 .583	.838 .748 .661	.785* .719	.763*		
16	1 2 3	.845* .657 .714	.881 .762* .790*	.824 .836	.872			
17	1 2 3	.438 .568 .527	.714 .780* .662	.773* .826 .766*	.814 .866 .809	.856		
18	1 2 3	.749 .787* .769*	.802* .851 .849	.852 .887 .885	.912			
19	1 2 3	.408 .744 .373	.703 .812* .582	.766* .856 .745	.819 .883 .813*	.924 .843	.870	
20	1 2 3	.739 .597 .376	.829* .713 .584	.867 .803* .678	.832 .747*	.860		
21	1 2 3	.895* .712 .415	.783* .602	.824 .702	.759*			
22	1 2 3	.692 .653 .516	.805* .766* .678	.859 .844 .770*	.885 .840			
23	1 2 3	.751* .439 .423	.848 .650 .571	.874 .729 .699	.773* .749	.811 .787*		
24	1 2 3	.693 .490 .514	.791* .613 .630	.829 .689 .732*	.743*			

 $\underline{S25}-\underline{S30}$ : Seventh Grade, Low I.Q., Boys  $\underline{S31}-\underline{S36}$ : Seventh Grade, Low I.Q., Girls

<u>s</u>	Topic	1	2	3	4	5	6	7
25	1 2 3	•769* •740 •793*	.819 .819* .853	.858 .861 .886	.885 .894 .908			
26	1 2 3	.760* .454 .891*	.836 .759* .915	.858				
27	1 2 3	.576 .656 .351	.727 .797* .606	.782* .844 .715	.823 .781*	.907		
28	1 2 3	•785* •579 •338	.848 .728 .563	.881 .815* .726	.848 .780*			
29	1 2 3	.629 .479 .410	.783* .661 .549	.829 .740 .651	.849 .782* .704*			
30	1 2 3	.838* .514 .473	.881 .747 .696	•800* •760*	.836 .804	.842		
31	1 2 3	.660 .448 .523	.808* .684 .741	.727 .819*	•758* •899	.945	.971	
32	1 2 3	•895* •758* •209	.823 .293	.856 .381	.453	.545*		
33	1 2 3	•859* •503 •363	.891 .631 .511	.913 .720 .647	•754* •706	.800 .748*		
34	1 2 3	.603 .362 .314	.710 .524 .525	.797* .626 .691	•696* •765*	.821		
35	1 2 3	.561 .699 .340	.734 .770* .576	.781* .827 .649	.819 .699	.743*		
36	1 2 3	.809* .423 .513	.861 .661 .700	.707 .794*	.770* .836	.814		

S37-S42: Seventh Grade, High I.Q., Boys S43-S48: Seventh Grade, High I.Q., Girls

<u>s</u>	Topic	1	2	3	4	5	6	7
37	1 2 3	.722	.794* .724	.840 .807*	.879	-	052	
38	3	.741	.834*	.887	.915	.929	.953	
	2 3	.461	.696 .684	•764* •806*	.817			
39	1 2 3	.787* .433	.867 .734	.904 .810*	.930	.946		
40	3	•910 752*	.040	.709"	903	• 857		
10	23	.496 .337	.713	.791* .708	.840 .787*	.843		
41	1 2	.697 .488	.755* .684	.823 .793*	.850 .831			
	3	.456	.622	.749	.803*	.846		
42	1 2	.751* .553	.849 .759*	.884 .804	.835			
	3	.529	.777*	.874	.925	.953		
43	1 2 3	.873* .586 .895*	.887 .777*	.900 .823				
44	1 2	•887* •769*	.909	.922				
	3	.258	.433	.559	.636	.688*		
45	1 2 3	.636 .463 .782*	.803* .756* .840	.806 .872	.847 .900			
46	1	• 856* • 392	.886	. 720	.765*			
	3	.313	.471	.593	.674	.725*		
47	1 2 3	.756* .560 .549	.851 .700 .730	•775* •799*				
48	1 2 3	.599 .682 .290	.771* .832* .529	.820 .859 .636	.848 .887 .735*			

 $\underline{S49}-\underline{S54}$ : Eleventh Grade, Low I.Q., Boys  $\underline{S55}-\underline{S60}$ : Eleventh Grade, Low I.Q. Girls

<u>s</u>	Topic		2	3	4	5	6	7
49	1 2 3	.754* .465 .328	.897 .721 .476	.888 .794* .628	.939 .868 .746	.968 .893 .794*	.987	
50	1 2 3	.687 .697 .506	.814* .877* .756*	.834 .899 .825	.855 .927 .881	.959 .913	.994 .945	
51	1 2 3	.721 .536 .396	.795* .681 .605	.850 .776* .741	.879 .819 .777*	.829		
52	1 2 3	.896* .473 .396	.713 .682	.792* .788*	.832 .815	.859		
53	1 2 3	.496 .545 .424	.618 .805* .575	.699 .846 .684	.758* .882 .748	.887 .790*		
54	1 2 3	.840* .512 .529	.870 .615 .687	.879 .725* .743	.796*	.837		
55	1 2 3	.748 .566 .515	•829* •784* •788*	.857 .833 .835	.887 .859 .874	.906		
56	1 2 3	.553 .715 .186	.728 .824* .345	•779* •859 •458	.811 .517	.571	.612*	
57	1 2 3	.589 .444 .390	.723 .652 .639	•788* •788* •773*	.827 .840 .815	.876 .857		
58	1 2 3	.610 .653 .394	•749 •757* •535	.794* .811 .665	.743	•787*	.817	
59	1 2 3	•888* •739 •585	.909 .826* .677	.928 .858 .754*	.785			
60	1 2 3	.716 .608 .756*	.799* .775* .856	.847 .828 .889	.860			

S61-S66: Eleventh Grade, High I.Q. Boys S67-S72: Eleventh Grade, High I.Q., Girls

<u>s</u>	Topic		2	3	4	5	6	77
61	1 2 3	.749 .602 .443	•844* •779* •730	.875 .832 .788*	.870 .819			
62	1 2 3	.804* .441 .578	.855 .634 .787*	.886 .722 .844	.914 .774* .881			
63	1 2 3	.539 .700 .504	•757* •823* •675	.829 .852 .790*	.880 .894 .850	.933 .891		
64	1 2 3	.685 .484 .617	.801* .776* .795*	.838 .847 .885	.871 .866 .918	.898 .904 .953	.972	
65	1 2 3	.576 .707 .395	.721 .811* .649	.803* .871 .795*	.847 .904 .850	.886	.921	
66	1 2 3	•774* •559 •500	.877 .786* .688	.901 .839 .816*	.867	.903		
67	1 2 3	.579 .468 .396	.789* .756* .617	.837 .805 .720	.842 .776*			
68	1 2 3	.572 .781* .779*	.748 .850 .858	•788* •878 •892	.799 .914	.842 .936		
69	1 2 3	.651 .585 .594	•796* •800* •782*	.831 .833		.893		
70	1 2 3	.641 .518 .563	.757* .685 .740	.832 .741 .810*	.869 .785* .861	.828		
71	1 2 3	.736 .411 .321	.801* .567 .614	.848 .692 .743	.876 .779* .799*	.821 .835		
72	1 2 3	.699 .569 .593	.789* .724 .764*	.836 .796* .835	.859 .833 .869	.902		
