COGNITIVE COMPLEXITY AND THE EFFECT OF SCHEMAS ON THE LEARNING OF SOCIAL STRUCTURES

by

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CHAPTER I: INTRODUCTION

The growth of such academic areas as social psychology, social relations, communication, and human relations has paralleled a growing concern in our society with the processes involving the interaction of two or more individuals. In the past such study has in general taken a semi-sociological viewpoint emphasizing groups, cultural factors, and social attitudes (see Allport, 1954). As late as 1935, Allport (1935) could claim that the study of social psychology was essentially the study of attitudes. While to some degree this continues today, the last two decades have witnessed a shifting of emphasis to approaches which emphasize the individual person's role in interpersonal behavior. As a natural consequence of this shift, interest has been shown for the role in interpersonal relations of individual personality differences, cognitive structures, and social perception.

The present study falls clearly within this latter approach. Specifically, this study emerges from a concern for the role of perception in interpersonal behavior. Such writers as Heider (1958) have argued convincingly that social perception--in particular the perception of another person--is a basic determinant of social behavior. The conceptual activity in person perception is of special significance for interpersonal relations for several reasons. In the first place, the object of perception in this case is the other with whom the perceiver is interacting. Hence, the effect of perception in interpersonal behavior is likely to be maximal when its result is an impression of the other person--especially an impression so clearly defined as to constitute a basis for action toward the other. Second, in perception of another person, perhaps as in no other cognitive act, the perceiver's feelings toward the perceptual object, the other's feelings toward the perceiver, and the perceiver's feelings toward himself are all intertwined with the cognitive act. Finally, person perception is a uniquely important conceptual activity in that only here does the perceptual object--another person--possess the same capacity for representation and action as the perceiver. This fact, coupled with the close nexus of feeling and cognition in social perception, produces a truly interactive and reciprocally adjustive process.

A comprehensive study of social perception must inevitably include all the factors that are of significance in determining how one forms an understanding of another. Such factors as the qualities of the other person, the context of the interaction, the cognitive makeup of the perceiver, and many more must all be included.

One such important factor is the social framework within which interpersonal behavior takes place. An important dimension of this framework is, of course, the system of relationships existing among a person and his acquaintances. Thus, when a person moves into a new group, it is necessary for him to learn the relationships existing among the members of that group if he is to have a clearly defined framework within which he is to function interpersonally. The focus of this study was on some of the cognitive processes involved in learning the system of relationships holding within a group. Specifically, the study dealt with the effect of subjects' expectations about the organization of social structures on the rates at which they were able to learn those structures. Further, the study investigated the difference in expectations held by subjects differing in cognitive complexity.

Toward the end of providing a rationale for the specific hypotheses that were tested, this chapter treats two major substantive topics: first, the concept of cognitive complexity and its importance for social perception; and second, the nature of social schemas and their role in interpersonal perception and behavior. In a final section, the problem focused on in the present study is presented along with the specific expectancies that were tested.

Constructs, Cognitive Complexity, and Social Perception

In considering social perception, a constructivist position is taken. The constructivist approach has its roots in the Kantian assumption that the world is known or organized according to certain structural givens. The approach receives perhaps its most complete statement in the philosophy of symbolic forms espoused by Cassirer (1953). The world, the constructivist holds, is not apprehended directly without any mediation on the part of the organism, nor is it simply distorted by the individual in accordance with some preexisting pattern. Rather, in perception the individual reconstructs the perceptual object within a system of cognitive structures.

One conception of the cognitive structures via which the object is perceptually organized is presented in George Kelly's Psychology of Personal Constructs (1955). Kelly takes as his model man as scientist. He contends that man, like the scientist, attempts to so understand and order his world that he can anticipate events and thus exert some control over them. Man accomplishes his goal of prediction by employing a system of constructs which functions as a perceptual frame. Constructs, then, are dimensions in terms of which events are construed or interpreted. More specifically Kelly defines a construct as anything that a person uses to distinguish two similar things from a third. The notion of construct, therefore, always includes the concepts of similarity and contrast. He defines construing, which he calls the process of "erecting" the perceptual object as follows: "By construing we mean 'placing an interpretation': a person places an interpretation on what is construed. He erects a structure, within the framework of which the substance takes shape or assumes meaning. The substance which he construes does not produce the structure, the person does" (Kelly, 1955, p. 50). Any event can assume form and meaning only in so far as it is ordered within the construct system. As Kelly (1955) says (p. 61): "Man's thinking is not completely fluid; it is channelized. If he wants to think about something he must follow the network of channels he has laid down for himself, and only by recombing old channels can he create new ones. These channels structure his thinking and limit his access to ideas of others. We see these channels existing in the form of constructs."

One of the assumptions underlying the constructivist approach to social perception in general, and this study in particular, is that individuals whose conceptual systems differ along some dimension will differ in their constiuction of events. Crockett (1965) has used Werner's developmental psychology to infuse Kelly's idea of construct system with criteria for assessing cognitive complexity in terms of developmental status. The touchstone of Werner's developmental approach is the orthogenetic principle: "Wherever development occurs it proceeds from a state of relative globality and lack of differentiation to a state of increasing differentiation and hierarchic integration" (1957, p. 127). Crockett (1965) has defined cognitive complexity in Wernerian terms as follows (p. 49): "A cognitive system will be considered relatively complex in structure when (a) it contains a relatively large number of elements [constructs] and (b) the elements are integrated hierarchically by relatively extensive bonds of relationship." Crockett's conception of the complexity of the construct or cognitive system thus includes two aspects: cognitive differentiation, or the number of interpersonal constructs or elements in the system; and cognitive integration, or the interrelatedness of the elements comprising the system.

The principal measure used as an index of cognitive complexity in the studies that are most closely related to the present one has been the Role Category Questionnaire (Crockett, 1965). This questionnaire requires the subject to describe in writing a number of people well known to him. The role categories into which these individuals must fall are specified so that the individuals differ systematically with respect to sex, age, and whether they are liked or disliked by the subject. The operational measure of complexity is the total number of interpersonal constructs (traits) spontaneously generated in describing these individuals. One point should be noted, namely, that since the subject need not integrate the constructs in his description, the measure of complexity is really only a measure of cognitive differentiation.[1]

A considerable amount of research has shown that subjects differing in cognitive complexity, as measured by the Role Category Questionnaire, respond differently in social perception and impression formation tasks One group of these studies (Nidorf and Crockett, 1965; Rosenkrantz and Crockett, 1965; Mayo and Crockett, 1964; Meltzer, Crockett, and Rosenkrantz, 1966, Kenny, 1968, Crockett, Gonyea, and Delia, 1970) has demonstrated that when complex and noncomplex subjects are presented a series of evaluatively bivalent qualities supposedly describing an unknown other, complex subjects typically produce impressions which are more highly differentiated and in which the information of both valences is represented and integrated. Another study (Press, Crockett, and

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[1]Rosenkrantz (1962) reports that this measure does not correlate with tests of intelligence and shows only a low positive correlation with verbal fluency. While other approaches to cognitive complexity have appeared (Bieri, 1955, Harvey, Hunt, and Schroder, 1961, Witkin, et al. 1962; Scott, 1962) with varying degrees of success, none have had as direct an application to processes of social perception and impression formation as Crockett's. Further, it is interesting to note that Bieri's measure does not correlate with Crockett's (Irwin, Tripodi, and Bieri, 1967). For a discussion of some of the different approaches to cognitive complexity see Vanov (1965).

Rosenkrantz, 1969), described in detail later, found that complex subjects were less likely to rely on simple organizing principles in learning the relations that held within a group. All these studies point to the conclusion, which is further tested in this study, that subjects differing in cognitive complexity function somewhat differently in perceptually constructing social objects.

Schemas, Social Schemas, and Social Perception

The Concept of Schema

A concept similar to Kelly's notion of the construct is that of schema. As it is usually used, a schema is envisioned as a cognitive structure to which events or objects are ordered and via which the total object is reconstructed. More loosely, it is a disposition to organize aspects of the environment in a particular way. While the term schema, like construct, may refer to cognitive structures which function in the construction of discrete aspects of the environment, it refers more directly to superordinate organizing constructs which provide the conceptual pattern for an entire array of discrete events.

One of the most important statements concerning the concept of schema is that supplied by Piaget in his development of a "genetic epistemology" (see Piaget, 1970). Feffer (1970) provides a summary of Piaget's basic position concerning schemas:

> Basic to the cognitive nature of Piaget's viewpoint is a Kantian assumption which he shares with the classical Gestalt theorists, namely, that the world is known or organized in accordance with certain structural givens. However, in fundamental opposition to the traditional Gestalt viewpoint

> is Piaget's central concept of development; that in so organizing the object, these structures themselves are changed in ways which permit a more penetrating construction of the "thing in itself." More specifically, these structures on the cognitively primitive sensory-motor level refer to the constitutionally given basis of such diffuse forms of behavior as sucking and grasping patterns (schemas). Piaget (1963a) assumes that such schemas have a built-in disposition to repeatedly construct the object until sufficiently consolidated or strengthened. Given the nature of an average environment, this intrinsic need for cognitive structures to exercise themselves sets into motion the basic developmental trend. Thus, a variety of different objects are ordinarily available for the consolidation of the sucking reflex (assimilation). However, in sucking each newly encountered object, the organism changes its behavior in accordance with the specific aspect of the object (accommodation), hence a number of slightly different schemas more specifically attuned to reality. A sucking schema, which originally had a unitary global character becomes differentiated into sucking patterns geared to nipple, thumb, pillow, etc. Since each is now a newly formed schema, the whole cycle of repetition and consolidation is again triggered, resulting in the incorporation of a new range of objects. Thus, there is an increasing differentiation of the original global behavior pattern into an increasingly complex network of related schemas (pp. 197-98).

Here, of course, Feffer is discussing Piaget's conception of a schema as the construction of a simple motor act (sucking). In Piaget's genetic epistemology, then, a schema is "a cognitive structure which has reference to a class of similar action sequences; these sequences are strong, bounded totalities in which the constituent behavior elements are tightly interrelated" (Flavell, 1963, pp. 52-53).

The schema, while referring to a behavioral act in Piaget's discussion, is not limited to the behavior. Instead, as Flavell (1963) notes, the schema refers to a cognitive structure, a disposition to carry out the behavior sequence on repeated occasions. The constituent behavior sequence is an organized totality; the behavioral components form a strong whole, a recurrent and clearly identifiable pattern. A schema, hence, is a kind of concept or underlying strategy which subsumes a whole collection of distinct but similar action sequences.

Once constituted, schemas are applied again and again to assimilable aspects of the environment. When aspects of the environment are confronted that cannot be assimilated, accommodation occurs with a concommitantly increasing differentiation of the schema and recognition of the range of phenomena to which each applies.

The role of schemas in more complex conceptual activities is pointed to by Bartlett (1932) in his summary of a number of early learning and problem solving studies. In his discussion of memory he notes, for example, that "the practiced O usually has a regular schema with a place for every item, and his memorizing consists in placing the items in the schema. Remembering the lists consists largely in finding the items in their places" (p. 32).

Likewise, Woodworth (1938) describes an experiment by Perrin who found that subjects trying to trace a stylus maze blindfolded attempted to discriminate, memorize, and combine the parts. The latter was done by mental backtracking and anticipation. When the subjects had mastered the maze, their learning transferred readily to a much smaller, but identical maze, to the same maze rotated 90 or 180 degrees, or to tracing the maze backwards. The subjects, Woodworth reasoned, had a "visual" image of the maze and could even "turn it around" when the maze was reversed. While the cues were changed, he says, the objective situation and the subject's knowledge of that situation were unchanged. The new cues from the altered maze gave the old meanings. The schema, hence, supplied a pattern of expectations which allowed the maze to be reconstructed.

The concept of cognitive schemas is similarly applied by Woodworth (1938) in discussing an experiment by Vandervelt concerning the learning of visual and motor patterns, problem solving and word completion experiments by Claparède, Duncher, and Selz, and an experiment by Galli and Zama on recognition of figures. In all of these cases the results suggested to Woodworth that the subject first developed an overall conception of the task object. This overall conception, or schema, then guided his completion of the task.

Social Schemas

As stated earlier, the present study is an investigation of some of the processes operative in learning social relations existing among a group of individuals. DeSoto (1960) comments on this learning process as follows:

> Learning a social structure means learning the relations among a group of people. It is a task that usually faces a person when he enters a social group, and it can be quite difficult as indexed by the information he must assimilate. It is a reasonable prediction that his assignment of properties of the relations which form the structure, operating as expectancies or hypotheses, will facilitate or hinder his learning of the structure according to their validity (p. 417).

The prediction that a person's expectancies of the relations which form the structure will affect his learning of those relations was tested in DeSoto's investigations. DeSoto and Kuethe (1958) had previously found that subjects systematically attributed mathematical properties to interpersonal relationships. Given a variety of hypothetical situations of the form: "If A likes P, how does B feel towards A?," subjects generally attributed the property of symmetry to relationships such as "likes" and "confides in" and the properties of asymmetry and transitivity to the relationship "influences."[2]

In DeSoto's subsequent study (1960), subjects were called upon to learn a social structure in a paired-associates learning task. The stimuli were pairs of people; for each pair the correct response was the relationship of the first to the second. The results showed that the expectancies of subjects were reflected in their rates of learning. The symmetric relations of "liking" and "confides in" were easier to learn in a social structure which was also symmetric; the asymmetric relationship, "influences," was easier to learn in a transitive and antisymmetric social structure.

The results were interpreted by DeSoto as strongly supporting the original hypothesis. DeSoto (1960) concluded:

> . . . it is as if the Ss had a theory about the social structures, a mathematical model for it which was very helpful when the properties corresponded with those of the social structure. . . such a theory seems most aptly called a schema, roughly following Bartlett (1932). . . . (p. 420)

Here the concept "schema" is used, just as was discussed previously, to represent an individual's predisposition to organize information in a

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[2]Symmetry is reciprocity; that is, if A likes B, then B likes A. Transitivity refers to the condition in which if A holds a relation to B and B holds that relation to C, A also holds that relation to C; that is, if A influences B and B influences C, then A influences C.

particular fashion. In DeSoto's studies, hence, the degree of difficulty subjects had in learning a given social structure was affected by the congruence between the pattern of relationships expected by the subject--his social schema--and the pattern actually represented in the structure. These results suggest rather convincingly that in first coming to understand the set of relationships existing among a group of people, perceptions are strongly influenced by the social schemas possessed by the particular perceiver.

Previous research on social schemata that is directly relevant to the present investigation has been conducted primarily on the schemas applied to such transitive antisymmetric relations as "influences" and "dominates" and those applied to such symmetric relations as "likes" and "confides in." This research is summarized in the next few pages so as to establish the basis for considering the specific problem which is the subject of this thesis.

The Linear-Order Schema. The research of DeSoto and his associates has centered principally on refining the conception of a complete, single linear-order schema that accompanies such relations as "dominates." That is, dominance-related relations are expected to be complete linear-orders and are, hence, learned much more readily when they appear within a structure that is transitive overall and in which the pair-relations are antisymmetric. A number of studies (DeSoto and Kuethe, 1959; DeSoto, 1960; DeSoto, 1961; Mandler and Cowan, 1962; Lewit, 1963; London, 1966; Van Kreveld and Zajonc, 1966; Henley, Horsfall, and DeSoto, 1969) have consistently reproduced the finding that the linear-order schema has a powerful influence on the rate at which subjects learn dominance structures. Expecting dominance relations to form a complete, single order with no reciprocal cycles, subjects have relatively little difficulty in learning structures which correspond to this pattern. Conversely, they demonstrate great difficulty in learning structures that are not congruent with this expected pattern of relationships.

In their latest writings on the linear-order phenomena, DeSoto and his coworkers have treated the phenomenon as representing the functioning of a conceptual "good figure" in the Gestaltist tradition (DeSoto and Albrecht, 1968a; DeSoto and Albrecht, 1968b; Henley, Horsfall, and DeSoto, 1969). Following the law of pragnanz which holds that a figure will be as complete as conditions allow, they contend that an end-anchored, complete linear-order constitutes the preeminent good figure for relations such as dominates. Since one cognizes the total pattern in accordance with the structural properties of the good figure, there is a stress toward the construction of the structure congruent with the good figure.

While the discussion of the expectation of linear-orders in these terms does clarify some of the specific properties of the ordering figure, it seems to add little to our theoretical understanding of them. In fact, I would suggest that the concept of schema as discussed earlier actually provides a preferable theoretical basis for understanding this phenomenon. In particular, as we noted with Feffer (1970) earlier, the Gestalt concept, while providing a comparable conceptualization of the effects of structural factors in cognition, fails to supply a means for explaining the development and change of such cognitive structures. The concept of schema, on the other hand, provides both the basis for understanding the process by which perceptual manifolds are construed and the basis for generating some conception of how the disposition to organize structures in a certain way develops and changes. While at this point the disagreement over labels may appear academic and even pedantic, it is a point to which we return later in considering the relationship of cognitive complexity to schemas. For the present suffice it to say that the extensive investigations of DeSoto and his colleagues have supplied impressive support for the operation of a linear-order schema in the cognitive organization and learning of dominance relations.

Going beyond their own experimental evidence, DeSoto and his colleagues have argued further that the linear-order schema has extensive generality in the conduct of ordinary human affairs. When faced with events that deviate from the expected linear pattern, Henley, Horsfall, and DeSoto (1969, p. 198) contend that people will: "1. avoid seeing cycles [nonlinear-ordered subparts of a structure], distort their perception of them, and minimize the number of cycles perceived; 2. tend to do things to change the actual structure so that there are fewer cycles (preferably none); and 3. suffer cognitive strain, if they are forced to perceive cycles which they are unable to change." Evidence from several sources supply evidence in support of these expectations. DeSoto (1961), for example, points out that scientists have expressed puzzlement over the nonlinear nature of the "pecking order" of flock birds, not realizing apparently that the pecking is based on pair-wise dominance rather than on a total dominance hierarchy for the flock.

Further "real world" manifestations of the presence of the linear-order schema are observable according to Henley, Horsfall, and DeSoto (1969) in the research on power differentials and status congruency. Concerning power differentials, they comment (p. 199): "Power differentials between persons or groups can derive. . . from different bases (French and Raven, 1959), and in a large structure can well create cycles. We would expect people who think about power, including social scientists, to find undue appeal in conceiving of power differentials as yielding a ranking." They then proceed to demonstrate that just such a conception of power differentials is evident both in the layman's conception and in the stratification theory of social power which sees a single hierarchy of power within the community.

Similar effects of cognizing social stimuli in terms of a linear-order is evident in the research on status congruence. As Jackson (1962, p. 469) comments, status congruence research focuses on the degree to which an "individual's rank positions on important societal status hierarchies are at a comparable level." Jackson's research has shown that when an individual's rank positions on several status hierarchies are not at a comparable level, status incongruency results and is accompanied by psychophysiological stress. Consistent with this finding, Whyte (1943) reported in his classic study of the Norton

Street Gang that the group attempted to make an ordering of bowling scores consistent with the status ordering. Adams (1953) even found a direct relationship between status congruency and social performance: "the subject crews seem to behave in an increasing harmonious, trusting, and cooperative manner as crew status congruency increases."

In summary, then, individuals seem to prefer complete linear-orders for a wide range of social relations, but especially for dominance-related relationships. Previous research, most notably that of DeSoto and his co-workers, strongly suggests that the cognitive expectation of a single and complete linear-order for such social relationships guides our perception, learning, and understanding of structures based on these relationships.

The Balance Schema. While the bulk of social schema research has focused on the linear-order schema, several studies have investigated other social schemata. While much of this work is tangential to the present study (e.g., Kuethe, 1962a; Kuethe, 1962b; Kuethe and Weingartner, 1964; Wunderlich, Youniss, and DeSoto, 1962), some work similar to that of DeSoto and his co-workers has been conducted. Zajonc and Burnstein (1965a), for example, suggested that the notion of cognitive balance as developed by Heider (1946; 1958) presents a schema for the likes-dislikes relation that is analogous to the linear-order schema for dominance relationships. In a series of studies (Zajonc and Burnstein, 1965a; 1965b) using the paired-associates technique they had subjects learn social structures consisting either of two people and one issue or two people and two issues. Six different structures were learned in the first study and three in the second study. The subjects were required to learn whether each person liked or disliked the other and whether each person supported or disapproved the issue(s). According to Heider's conceptualization some of the structures were balanced and some unbalanced.

While the results of both studies showed some evidence in support of the balance principle as an organizing schema, in reporting the second study Zajonc and Burnstein (1965b) concluded that their results did not give substantial support to the balance hypothesis. Instead of retaining the notion of schema in explaining their results, Zajonc and his associates shifted their interpretation to the identification of the various sources of "cognitive bias" that affected the rate at which the structures were learned. In Zajonc and Burnstein's (1965a) initial study the results suggested that balanced structures were easier to learn than unbalanced structures and that positive bonds were easier to learn than negative bonds. The balance effect, however, was not great as it was evident only when there was an important issue. When the issue that constituted the object of orientation was unimportant there was a slight reversal of the balance effect. In their second study Zajonc and Burnstein (1965b) reconfirmed the effect of balance and positivity and further suggested that reciprocity (i.e., symmetry), sign of the semicycle, length of the semicycle, the subject's own attitude toward the issue, and the preference for interpersonal relations over attitudinal relations also constituted sources of cognitive bias affecting learning rates. In subsequent studies (Zajonc and Sherman, 1967; Burnstein, 1967; Rubin and Zajonc, 1969) the concept of cognitive bias was maintained with several additional sources identified: minimal change, "friendliness" ("A likes B" implies "A likes C"), and "popularity" ("B likes A" implies "C likes A"). Of greatest interest is the fact that in these last experiments the effects of balance were not evident; no effect of structural balance on rate of learning was found by either Zajonc and Sherman (1967) or Rubin and Zajonc (1969).

In discussing the absence of any significant effect for structural balance in their paired-associates learning study, Zajonc and Sherman (1967) noted that the result was not in total disagreement with previous results because "incontrovertible evidence which favors the balance principle has yet to be produced" (p. 648).

For this assessment to be accepted, stress must be placed on the term incontrovertible. Although there have always been some important discrepancies, a number of studies have shown that interpersonal relationships tend toward balance, both phenomenologically and in fact (for extensive discussions of this research see Newcomb, 1968; Zajonc, 1968; Insko, 1967; and Keisler, Collins, and Miller, 1969). We have already noted the finding of DeSoto and Kuethe (1959) that liking pair-relations were expected to be symmetric. This pair-wise manifestation of the preference for balanced states has also been demonstrated to exist in three-entity social structures analogous to those originally suggested by Heider. Jordan (1953), for example, had subjects rate hypothetical social situations on a pleasantunpleasant dimension. While deviating from Heider's predictions in some instances, the results in general supported the balance hypothesis. Other studies in which hypothetical social structures were rated for their pleasantness have also provided general support for balance theory (Morrissette, 1958; Price, Harburg, and McLeod, 1965; Price, Harburg, and Newcomb, 1966, Rodrigues, 1965, 1966, 1967; Crockett, 1969). Similarly, studies in which the subject was asked to predict a missing bond (Morrissette, 1958; Shrader and Lewit, 1962), or to indicate which of the relations given he would most like to see changed (Rodrigues, 1966, 1967) give general, but not unequivocal support to Heider's hypothesis.

In addition to these studies that have shown a preference for balanced states in hypothetical situations, a number of studies have tested balance theory in actual interpersonal relationships. Horowitz, Lyons, and Perlmutter (1951), for instance, had individuals in a discussion group evaluate the action of one of the members. They found, consistent with balance theory, that the actions were evaluated favorably or unfavorably depending upon whether the other person was liked by the evaluator. Festinger and Hutte (1954) similarly found that subjects reported feeling unstable about their relationships in a group when they were led to believe that people they liked disliked each other. Using sociometric techniques, Kogan and Tagiuri (1958) found a strong tendency towards balanced interpersonal relationships among five groups of Navy men; they also found that the subject's perceived an even higher degree of balance than actually existed. Consistent results in support of the operation of pressures toward balance in actual social situations are reported by Davol (1959), Sampson and Insko (1964), and Burdick and Burnes (1958).

These studies, taken together, have shown that people tend to represent interpersonal relationships in balanced configurations and that social structures do in point of fact tend toward balanced organizations. They suggest further that in learning social structures based on the likes-dislikes relation, subjects ought to rely on a balance schema somewhat analogous to the linear-order schema. If this is so, however, the question arises as to why Zajonc and his associates found such small evidence of a balance schema in affecting the rates at which their social structures were learned. The answer probably lies, as Newcomb (1968) has suggested, in the fact that the experimental procedure in the Zajonc ease-of-learning studies led subjects to introduce hypotheses and cue-searching related to single relations or relation-pairs rather than to entire structures. Without being told the nature of his task, each subject was called on to learn several social structures at once. It seems quite unlikely that the subjects would apply a superordinate organizing schema when they did not know they were learning the relations comprising social structures.

This conclusion regarding the Zajonc studies is borne out by the results of two recent studies which employed the paired-associated paradigm but avoided some of Zajonc's methodological problems. DeSoto, Henley, and London's (1968) investigation of the grouping schema--the expectation that there will be positive relations within groups and negative relations or no relations between groups--produced very significant evidence in support of the proposition that an expectation of balance operates in such a way as to direct the learning of social structures. The same conclusion was reached by Press, Crockett, and Rosenkrantz (1969).

Since this study of Press, Crockett, and Rosenkrantz is the direct precursor to the present investigation, it merits extended consideration. In their study, Press, Crockett, and Rosenkrantz clearly told their subjects that they were to learn the twelve relations comprising a four-person social group; each subject learned only one structure. As expected, a balanced structure incurred significantly fewer errors than two unbalanced structures. Of even greater interest, however, was the discovery that subjects low in cognitive complexity, as defined earlier in this chapter, made significantly fewer errors in learning the balanced structure than those subjects high in complexity.[3] After the initial trials the low complexity subjects also showed relatively little difficulty in learning an unbalanced structure which was organized according to a simple principle--one person liked and was liked by everyone, while all the other relations were negative. High complexity subjects, on the other hand, demonstrated significantly less difficulty in learning the relations comprising a highly unbalanced structure that could not be understood by any simple rule. These

[3]Although using a different measure of cognitive complexity, Scott (1963) also found that low complexity subjects showed a greater preference for balanced states. When asked to make groupings of twenty nations, his low complexity subjects were much more likely than high complexity subjects to produce groupings that correlated with their evaluation of the nations.

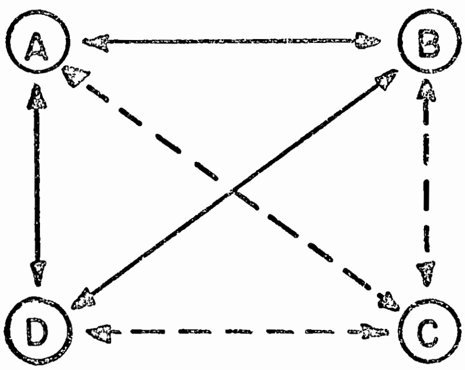
results led Press, Crockett, and Rosenkrantz to conclude (1) that the balance principle operates as a simple social schema for the likes-dislikes relation and (2) that subjects low in cognitive complexity rely more heavily on this schema than do high complexity subjects. The further finding that low complexity subjects were able to make use of an alternative simple organizing principle further suggests that low complexity individuals in general rely on simple social schemas in organizing and understanding their interpersonal world. As the earlier discussion of construct systems and cognitive complexity suggested, individuals possessing more highly differentiated and articulated systems of interpersonal constructs are able to deal with social stimuli via more complicated, more highly developed, processes. Apparently, such cognitively complex individuals also possess more complex and/or more differentiated social schemas for organizing groupings of interpersonal relationships. A more extensive investigation of this possibility is the focus of the present study.

The Problem and Hypotheses

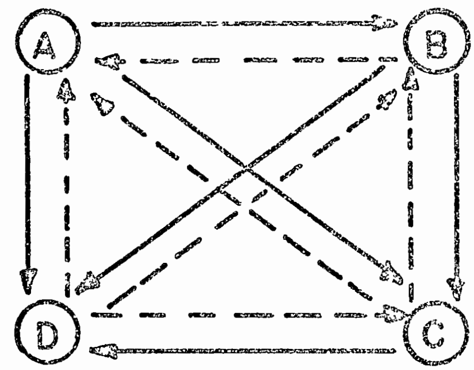
As the previous discussion has suggested, the present study was an investigation of the role of social schemas in affecting the rate at which individuals learn social structures. Most previous investigations of social schemas have been limited in two major respects: (1) they have examined schemas singly and (2) except for Press, Crockett, and Rosenkrantz, they have failed to consider the differential reliance on schemas by subjects differing along some important dimension which has been shown to affect social perception. The present study attempted to overcome these limitations by seeking a design which would allow extensive comparisons both between schemas and between different subjects' reliance on the schema. Accordingly, a factorial design was employed. The design, described in detail in Chapter II, factorialized four social structures, the likes and dominance relations, complex and noncomplex subjects, and multiple paired-associates learning trials.

The four social structures employed in the study are depicted in Figure 1. Each of the structures consisted of four people and the relationships between them. Each structure was presented with both the likes-dislikes and dominates-is dominated by relations. The structures differed systematically both in their degree of balance as defined by Heider (1946; 1958) and mathematized by Cartwright and Harary (1956) and in their degree of linearity as defined by DeSoto (1960; 1961) and mathematized by Henley, Horsfall and DeSoto (1969). An inspection of the diagrams in Figure 1 will reveal that in Structure 1, the balanced structure, all relations were symmetrical and transitive; in Structure 2, the complete linear-order, all relations were antisymmetrical and transitive; in Structure 3, the partially-balanced structure, relations were symmetrical but not transitive; and in Structure 4, the semi-ordered structure, relations were antisymmetrical but not transitive. Thus, if the assessment of social schemas that was presented earlier is accurate, Structures 1 and 2 "matched" the likes

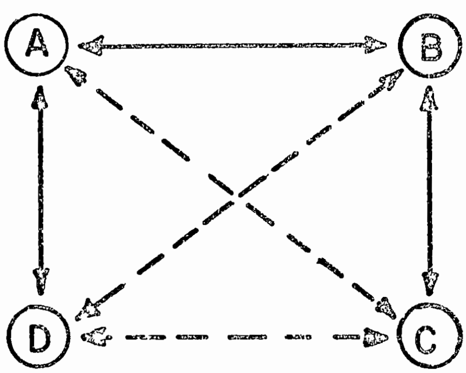
FIGURE I STRUCTURES USED IN THE STUDY



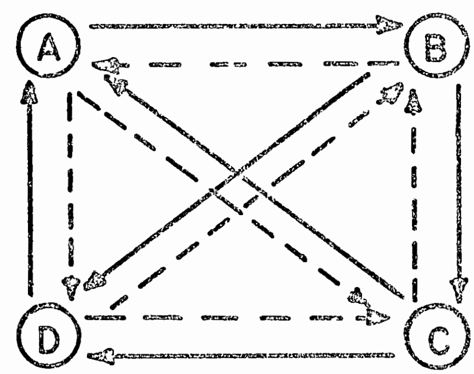
Structure 1 (Balanced)



Structure 2 (Linear-Ordered)



Structure 3 (Partially-Balanced)



Structure 4 (Semi-Ordered)

———— Likes or Dominates

- - - - - Dislikes or Is Dominated By

and dominance relation, respectively, Structures 3 and 4 matched neither relation exactly, though they more nearly approximated the like and dominance relation, respectively. The order of the structures according to their degree of balance is 1, 3, 4, 2 and according to their degree of linearity 2, 4, 3, 1.

In the experiment conducted, it was hypothesized that the difficulty of learning the social structure would be a function of its degree of balance under the likes relation and a function of its degree of linearity under the dominance relation. In particular it was hypothesized that Structures 1 and 3 would be easier to learn under the likes relation and that Structures 2 and 4 would be easier to learn under the dominance relation.

The second major focus of the present investigation, it will be recalled, was in finding individual differences in the schemata that subjects used in learning these structures. This question was investigated by assigning subjects who differed with respect to degree of cognitive complexity as operationalized by Crockett (1965). As was noted earlier, subjects differing in degree of cognitive differentiation were found by Press, Crockett, and Rosenkrantz (1969) to differ in their reliance on the balance hypothesis in learning social structures. To replicate and further generalize this finding, it was hypothesized that cognitively noncomplex subjects would make significantly fewer errors than complex subjects in learning the balanced structure (Structure 1) under likes and the linear-ordered structure (Structure 2) under dominance. Further, it was hypothesized that complex subjects would experience significantly less difficulty in learning the remaining configurations, all of which were unbalanced under likes and nonlinear-ordered under dominance.

Since the design used some structures with antisymmetric relations among members and other structures with symmetric relations, a direct examination of the relative strength of the balance as against the linear-order schema was possible. Although no directional prediction was made in advance, it was recognized that this comparison could potentially allow some definitive statements concerning the relative strengths of the two schemas.

Summary

Within the general framework provided by a constructivist approach to social perception, this study used a paired-associates learning paradigm in investigating the ease with which subjects learn the set of relationships comprising social structures based on either the likes-dislikes or the dominances-is dominated by relations. Previous research had indicated that individuals expect structures based on the dominance relation to be a complete linear-order and structures based on the likes relation to be organized according to the balance principle. On the proposition that these expectations on the part of subjects would function as a schema that predisposes them to organize the relationships in a certain way, it was hypothesized that the difficulty the subjects had in learning a given social structure would be a function of its degree of linearity under the dominance relation and its degree of balance under the likes relation. It was further hypothesized that subjects differing in cognitive complexity would display different abilities in dealing with structures that differed in degree of linearity or degree of balance. Thus, it was expected that noncomplex subjects would excel over complex subjects in learning the linear-ordered dominance and balanced likes configurations and the complex subjects would excel over the noncomplex subjects in learning the nonlinear and unbalanced configurations.

CHAPTER II: PROCEDURES

This chapter presents the basic procedures and methods followed in executing the experiment. The study was conducted as a 2 x 2 x 4 x 4 factorial design. The first three factors were between-subject factors: Complexity (complex vs. noncomplex subjects), Relation (likes-dislikes vs. dominates-is dominated by), and Structure (see Figure 1 for a description of the four social structures used). The fourth factor, trials, was a within-subject factor; each subject was given four trials to learn the relationships comprising one of the social structures.

The specific methods used in implementing this basic design are discussed below under three headings: (1) selection of subjects, (2) experimental task and procedure, and (3) summary of data analysis.

Selection of the Subjects

The subjects in this study were all students enrolled in one of fourteen Fundamentals of Speech Communication classes at the University of Kansas. This class is required of most students enrolled at the University and is generally taken during the Freshman year. Except in special cases students are assigned to the class on a random basis. All of the subjects participated voluntarily in two class sessions spaced about six weeks apart during October and November, 1969. All tasks were completed during these two sessions.

During the initial session, 295 subjects completed a modified version of the Role Category Questionnaire (Crockett, 1965). In this questionnaire the subjects described four peers, two males and two females, one liked and one disliked within each sex. Subjects were instructed to pay particular attention to each individual's habits, beliefs, ways of treating others, mannerisms, and similar attributes (see Appendix A for a copy of the Role Category Questionnaire). Five minutes were allowed for each such description.

Responses to the Role Category Questionnaire were later scored for the number of constructs the subject generated on these four descriptions.[4] This score, the total number of interpersonal constructs used in the four descriptions, constituted the measure of cognitive complexity (differentiation). Separate rankings of these scores were obtained for male and female subjects. These arrays were then divided at the median into those relatively high and those relatively low in complexity (mdn = 27 for males; mdn = 35 for females). Eighteen subjects above and eighteen below these medians were assigned

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[4]Fifty of the Role Category Questionnaires were scored by both the experimenter and another researcher trained in scoring the questionnaire. The correlation between these two scorings was $r = .93$. Twenty-five of the questionnaires were scored twice, several months apart, by the experimenters for test-retest reliability, yielding a coefficient of $r = .96$.

randomly to each of the eight treatments.[5] Care was taken to place approximately an equal number of males and females in each cell.

Experimental Task and Procedure

During the second session the subjects performed a paired associates learning task in which the stimuli were pairs of people and the relation between them. The correct response was then the recall of the relationship of the first to the second. The basic procedure was similar to that employed by DeSoto, Henley, and London (1968). Nine page booklets were prepared for each condition, consisting of a cover sheet and four identical presentations of an information and response sheet (see Appendix B). The cover sheet, which was read aloud by the experimenter, stated that subjects were to learn the relationships that held within a group of four people. The information sheet contained the twelve pairs of names and the correct relationship between each pair (e.g., "Bill likes John" or "Dave is dominated by Stan"). The names were presented in random

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[5]To give some assurance that the differences attributed to complexity were not the result of some more general intellectual difference in the complex and noncomplex subjects, a comparison was made on the cumulative grade point average of the members of the two groups. Due to the confidential nature of student files at the University of Kansas these were the best index of intelligence available. While not a direct assessment of intelligence, these scores do provide a rather clear index of the subjects' intellectual performance. Since complexity has not been found to correlate with intelligence in the past (Rosenkrantz, 1962; Press, 1967), not surprisingly the mean cumulative grade point averages were essentially the same for the two groups: complex = 1.61 and noncomplex = 1.52.

order except that care was taken to see that the two pairs based on the same names (e.g., John and Dave and Dave and John) did not follow each other. The response sheet contained the twelve name pairs in a different order and the subject circled the appropriate relation (e.g., Bill . . . likes, dislikes . . . John).

This learning experiment was administered as a paper-and-pencil timed learning task. On each of four trials, subjects studied the relations on the information sheet for one minute and then turned the page and spent 1 1/2 minutes circling the appropriate relation between each pair of names. The dependent variable was the number of errors per trial; scores could vary between zero and twelve on each trial.

Summary of the Data Analysis

Of the original 295 subjects, thirty-six were lost due to absenteeism during the second session. This left 259 subjects who completed the learning experiment. While maintaining the approximate balance between males and females in each cell (eight males and seven females or eight females and seven males), nineteen subjects were randomly discarded from the appropriate cells to leave an equal number in each cell (n = 15). Thus 240 subjects were included in the data analysis. The basic analysis employed was an analysis of variance with three between group factors (Complexity, Relation, and Structure) and one within-subject factor (Trials), with a trend analysis on this factor.

In addition to this basic analysis, several subanalyses were undertaken to clarify issues relating to specific questions. First, to examine the differences between complex and non-complex subjects, comparisons using the Newman-Kuels method were executed for each trial.

Second, comparisons were carried out between the number of errors made under the balance and dominance schemas in their matched and mismatched configurations in Structures I and II. Third, a repeated-measures analysis of variance was made on the number of errors occurring in relationship pairs involved in balanced and unbalanced or transitive and non-transitive triplets in Structures III and IV. This analysis is explained in detail when it is presented.

CHAPTER III: RESULTS

This chapter presents the results of the experiment. The mean number of errors made by subjects in each experimental condition is presented in Table 1, and the summary of the trend analysis upon the scores on which these means are based is presented in Table 2. The results produced in this analysis, along with the subanalyses, will be discussed relative to the two major questions being investigated: (1) the effect of schemas on the rate of learning and (2) the effect of cognitive complexity on the rate of learning.

Effect of Schemas on Rate of Learning

The Major Effect of Schemas

As Table 2 shows, the Structure x Relation interaction, which indicates the effect of schemas upon ease of learning, was significant beyond the .001 level. An examination of the means summarized in Table 1 shows very clearly the magnitude of the match or mismatch between structure and relation regardless of the level of complexity of subjects. For Structures 1 and 2, especially, learning entailed many fewer errors with the appropriate relation than with the inappropriate one (Figure 2). Fewest errors were made under the likes relation on Structure 1, the balanced structure, while the fewest errors under the dominance relation were made on Structure 2, the

Table 1. Mean Number of Errors per Trial for Complex and Noncomplex Subjects Learning Structures under the Liking or Dominance Relation.

	Structure 1 (Balanced)								Structure 2 (Complete Order)							
Relation	Likes				Dominates				Likes				Dominates			
Trial	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Complex Ss	3.9	2.3	1.1	1.1	7.8	5.8	4.1	3.2	5.1	3.2	2.0	1.7	3.2	1.2	0.3	0.1
Noncomplex Ss	2.2	1.3	1.2	1.0	7.4	5.2	5.9	5.3	4.4	3.1	2.9	2.0	2.9	2.0	1.1	0.5
	Structure 3 (Partly Balanced)								Structure 4 (Semi-Ordered)							
Relation	Likes				Dominates				Likes				Dominates			
Trial	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Complex Ss	5.6	3.2	1.7	0.9	5.9	6.2	4.7	4.1	6.2	3.9	2.6	1.3	5.8	3.7	2.7	2.4
Noncomplex Ss	6.1	3.9	2.7	1.7	6.7	6.3	6.0	5.3	6.1	4.3	3.8	2.7	6.3	5.0	4.2	2.3

Table 2. Summary Analysis of Variance with Trend on Number of Errors by Subjects in all Experimental Conditions

Source	SS	df	MS	F	P
Total	8085.98	959	8.43		
Between	4684.98	239	19.60		
Complexity (C)	49.50	1	49.50	4.36	.05
Relation (R)	352.84	1	352.84	31.11	.001
Structure (S)	643.63	3	214.54	18.91	.001
C x R	11.27	1	11.27	.99	
C x S	23.97	3	7.99	.70	
R x S	1044.77	3	328.25	30.70	.001
C x R x S	18.14	3	6.04	.53	
Pooled I	2540.87	224	11.34		
Within	3401.00	720	4.72		
Trials (T)	1294.00	3	431.33	155.41	.001
Linear	1248.48	1	1248.48	449.82	.001
Quadratic	41.67	1	41.66	15.01	.001
Residual	3.85	1	3.85	1.39	
C x T	59.05	3	19.68	7.09	.001
Linear	41.44	1	41.44	14.93	.001
Quadratic	7.70	1	7.70	2.78	
Residual	9.90	1	9.90	3.57	
R x T	14.38	3	4.79	1.73	
Linear	9.54	1	9.54	3.44	
Quadratic	4.54	1	4.54	1.63	
Residual	.30	1	.30	.11	
S x T	38.49	9	4.28	1.54	
Linear	28.21	3	9.40	3.39	.025
Quadratic	6.61	3	2.20	.79	
Residual	3.67	3	1.22	.44	

Table 2 (Continued)

Source	SS	df	MS	F	P
C x R x T	1.15	3	.38	.14	
Linear	.48	1	.48	.17	
Quadratic	.02	1	.02	.01	
Residual	.65	1	.65	.24	
C x S x T	26.55	9	2.95	1.06	
Linear	17.72	3	5.91	2.13	
Quadratic	6.14	3	2.05	.74	
Residual	2.68	3	.89	.32	
R x S x T	82.21	9	9.13	3.29	.001
Linear	67.00	3	22.33	8.05	.001
Quadratic	10.50	3	3.50	1.26	
Residual	4.70	3	1.57	.56	
C x R x S x T	20.04	9	2.23	.80	
Linear	10.46	3	3.49	1.26	
Quadratic	5.69	3	1.90	.68	
Residual	3.89	3	1.30	.47	
Pooled I x T	1865.13	672	2.78		

FIGURE 2 MEAN NUMBER OR ERRORS UNDER LIKES AND DOMINANCE RELATION IN EACH STRUCTURE

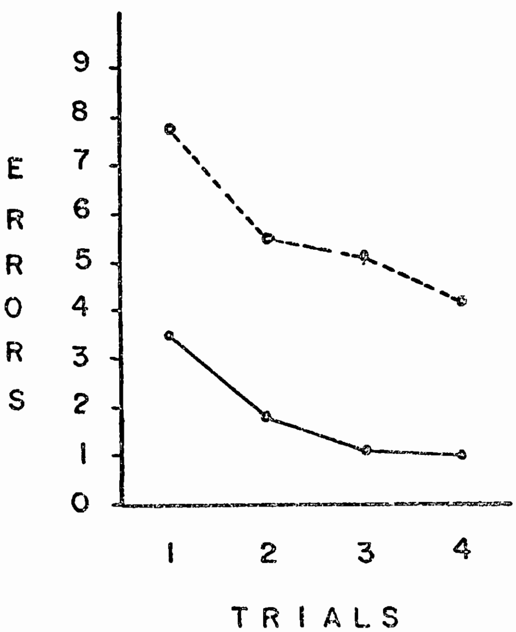


Figure 2a Structure 1

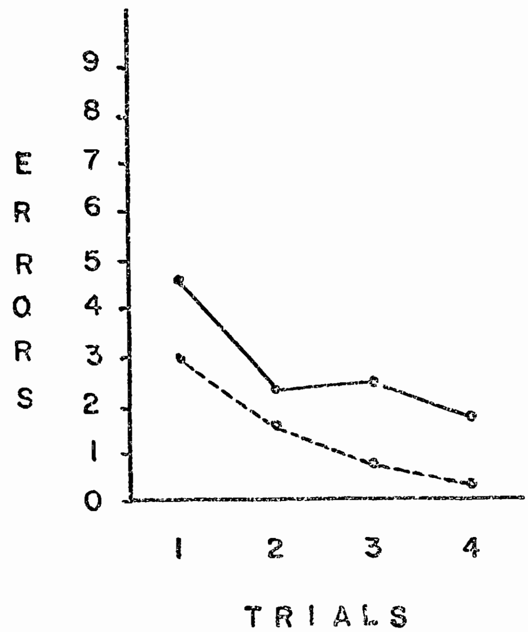


Figure 2b Structure 2

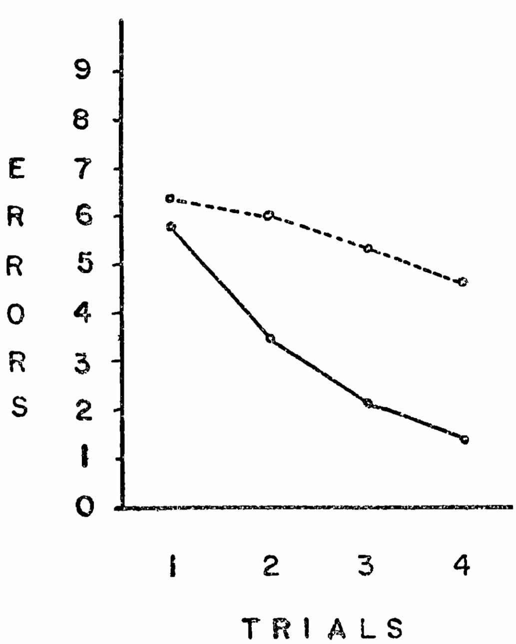


Figure 2c Structure 3

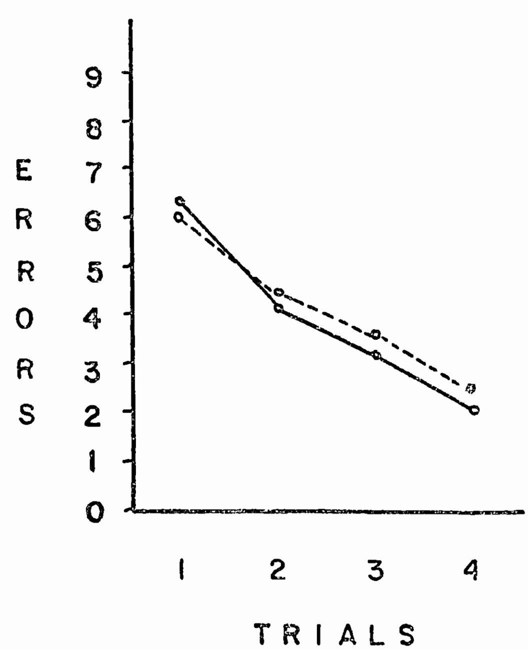


Figure 2d Structure 4

——— Likes

- - - - - - - Dominance

linear ordered structure. Figure 3 makes this interaction of structure and relation abundantly clear for Structures 1 and 2.

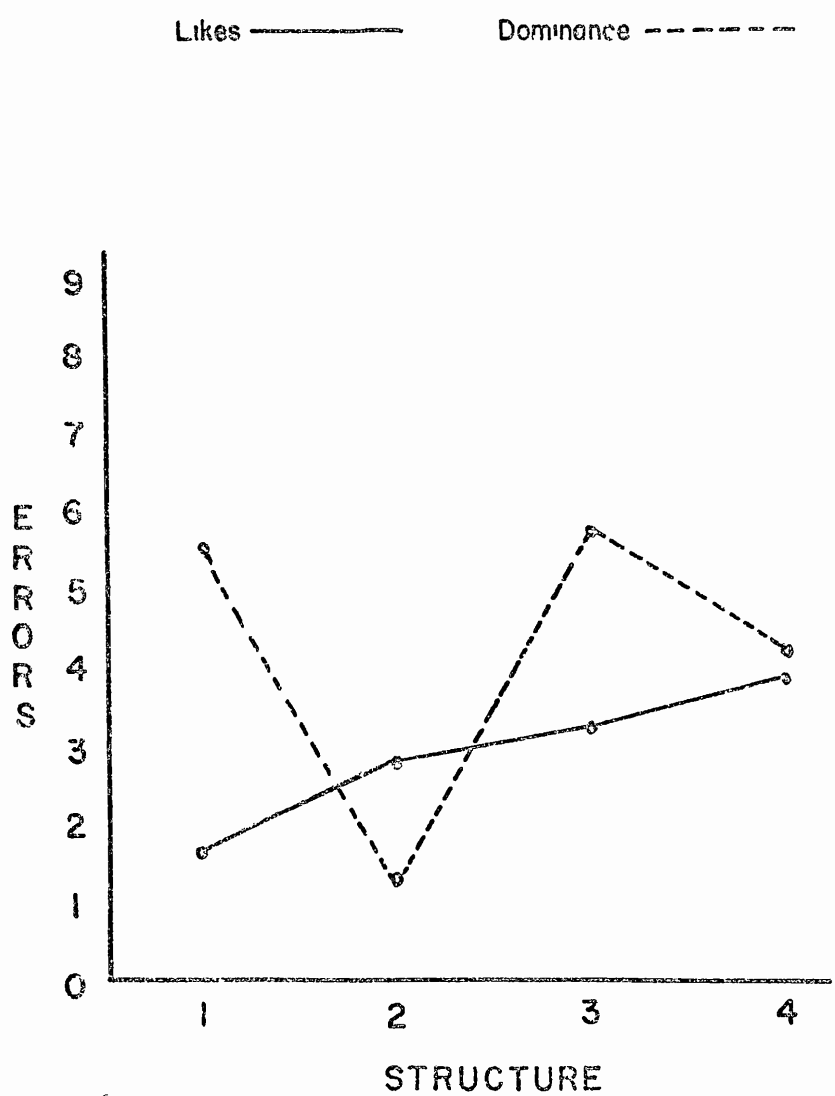
Figures 2 and 3 also show the effect of the balance schema in the learning of Structure 3, where all relations were symmetric but the structure was unbalanced. In this structure, as expected, fewer errors were made under the liking relation than under the dominance relation, especially on trials 2 through 4. Note, however, that in Structure 4--where all relations between members were anti-symmetrical but a complete order was not present--there were no fewer errors made under the dominance relation than under liking.

The trend analysis also showed significant interactions of structure and relation with the within-subject factor, trials. As can be seen in Figure 2, the significant Relation x Structure x Trials interaction reflects the fact that the rate of improvement across trials under the likes relation was much greater in its mismatched configurations (Structures 2 and 4) than was the rate of improvement under the dominance relation in its mismatched configurations (Structures 1 and 3).

Comparison of the Balance and Linear-Order Schemas

The design employed in this study allowed a direct comparison of the number of errors made under the linear-order and balance schemas as they operated in affecting the learning of Structures 1 and 2. When the structure and relation matched (Structure 1 under likes; Structure 2 under dominates), fewer errors were made under the dominance than under the balance schema--an average of 2.83 versus 3.52 errors per

FIGURE 3   INTERACTION OF STRUCTURE AND RELATION



trial. A comparison between these two means approached significance at the .10 level ($t = 1.83$, 28 df, two-tail).

The greater effect of the ordering schema is further indicated in the fact that when the relation did not match these two structures (Structure 1 under dominates; Structure 2 under likes) many more errors were made under the dominance relation. Across the four trials an average of 5.59 errors per trial were made on Structure 1 under the dominance relation, while an average of only 3.05 errors were produced in learning Structure 2 under the likes relation. This difference was significant by comparison at the .001 level ($t = 6.72$, 28 df, two-tail). Thus the dominance relation incurs non-significantly fewer errors in a matched configuration and significantly more in a mismatched one.

In addition to these comparisons of Structures 1 and 2, the nature of Structures 3 and 4 allowed a subanalysis bearing directly on the question of whether or not subjects actually apply an organizing schema in attempting to learn the set of relations comprising the total structure. Structure 3, it will be recalled, was a partially balanced structure composed of symmetrical, but not completely transitive, relations. A referral to Figure 1 will reveal that both triplets in which the pair CD is involved (i.e., ACD and BCD) are balanced. On the other hand, both triplets in which the pair AB is involved, (ABC and ABD) are unbalanced. The other four pairs, AC, AD, BC, and BD, are each involved in one balanced and one unbalanced triplet. Similarly for Structure 4, in which the relations were anti-symmetrical but not completely transitive, the pair AB is included in two linear-ordered triplets, (ABC and ABD) the pair CD in two non-linear ordered triplets (ACD and BCD), and the other four pairs (AC, AD, BC, BD) in one linear-ordered and one non-linear-ordered triplet. If subjects are bringing a schema to bear that is appropriate to the given relation, fewer errors should be made on the pair involved in two triplets which fit the schema, while more errors should be made on the pair involved in two triplets which violate the schema. The number of errors made on the mixed pairs should fall somewhere in between.

To test this effect separate comparisons were made on each of the four relation and structure combinations for Structures 3 and 4. A 2 x 3 analysis of variance with repeated measures on the second factor was utilized. The first factor was cognitive complexity, and the second was the relationship between pairs on which errors were made. These relation-pairs were divided, as described above, into those involved in two balanced or linear-ordered triplets, those involved in two unbalanced or non-linear-ordered triplets, and those involved in mixed triplets. The dependent variable was the number of errors made on the relation-pair, summed across the four learning trials. The sum of the four relation-pairs involved in mixed triplets was divided by four to make it comparable to the other two types of relation-pairs.

Table 3 shows clearly that for Structure 3 under the like relation the fewest errors were made on the CD pair which was included in two balanced triplets, especially for noncomplex subjects, and the most made on the AB pair which was in two unbalanced triplets. The difference among relations in balanced, partially balanced and unbalanced triplets was significant at $p < .05$ (Table 5). As would be expected, comparison of the same sets of pairs in Structure 3 when learned under the dominance relations revealed no systematic difference among means, except for the effect of cognitive complexity.

Similarly, Table 4 shows that under the dominance relation for Structure 4 fewer errors were made on the AB relations, the pair involved in two linear-ordered triplets. More importantly, by far the most errors were made on the CD relation which were involved in nonlinear-ordered triplets. There were no comparable differences evident for Structure 4 under the likes relation.

Effect of Complexity on the Rate of Learning

The trend analysis revealed a significant main effect of complexity (.05) and a significant Complexity x Trials interaction (.001). The linear trend of this interaction was significant beyond the .001 level.

Examination of Table 1 will help in understanding these results. First, the overall significant effect for complexity is indicative of the fact that complex subjects consistently made fewer errors across the four trials than did low complexity subjects. Even in those cases where noncomplex subjects performed better on initial trials, complex subjects were doing as well or better on the later trials.

It is this same performance by complex and noncomplex subjects that produced the very significant Complexity x Trials interaction.

Table 3. Mean Number of Errors Made over Four Trials on Relation Pairs in Balanced, Unbalanced, and Mixed Triplets for Structure 3 under the Likes Relation.

Types of Triplets	Balanced	Mixed	Unbalanced
Complex Ss	1.7	1.9	2.7
Noncomplex Ss	1.7	2.4	2.9
Overall Mean	1.7	2.1	2.8

Table 4. Mean Number of Errors Made over Four Trials on Relation Pairs in Transitive, Intransitive, and Mixed Triplets for Structure 4 under the Dominance Relation.

Types of Triplets	Transitive	Mixed	Intransitive
Complex Ss	2.2	2.3	3.6
Noncomplex Ss	2.3	2.9	4.0
Overall Mean	2.2	2.5	3.8

Table 5. Summary Analysis of Variance for Errors Made on Relation Pairs in Balanced, Mixed, or Unbalanced Triplets for Structure 3 under the Likes Relation

Source	SS	df	MS	F	P
Total	235.82	89			
Between	69.92	29			
Complexity (C)	1.41	1	1.41	<1	
Error	68.51	28	2.45		
Within	165.90	60			
Balance (B)	18.39	2	9.20	3.51	.05
B x C	1.02	2	.51	<1	
Error	146.49	56	2.62		

Table 6. Summary Analysis of Variance for Errors Made on Relation Pairs in Transitive, Mixed, or Intransitive Triplets for Structure 4 under the Dominance Relation

Source	SS	df	MS	F	P
Total	224.40	89			
Between	62.73	29			
Complexity (C)	8.96	1	8.96	4.66	.05
Error	53.78	28	1.92		
Within	161.67	60			
Transitivity (T)	48.50	2	24.25	12.24	.001
T x C	2.04	2	1.01	<1	
Error	110.96	56	1.98		

Figure 4 shows that when structure and relation matched, especially for the liking relation in Structure 1, noncomplex subjects made fewer errors initially than did complex subjects. On the other hand, when structure and relation were mismatched, though complex and noncomplex subjects made approximately equal numbers of errors initially, the rate of improvement on later trials was much greater for complex subjects.

The difference between complex and noncomplex subjects on Structure 1 under the likes relation was significant at the .01 level by the Newman-Kuels test on the first trial, but had disappeared by the third and fourth trials. Noncomplex subjects also performed slightly better on the initial trial of Structure 2 under the dominance relation, but the complex subjects outperformed the noncomplex subjects on the second and succeeding trials. The differences between complex and noncomplex subjects, however, did not reach significance for any of the trials.

When relation and structure were mismatched, especially for the dominance relation in Structure 1 and for both relations in Structure 3 and 4, complex and noncomplex subjects made approximately the same number of errors on the initial trial, but the rate of improvement was consistently faster for the complex subjects. These differences between complex and non-complex subjects were significant by the Newman-Kuels test at the .01 level on Structure 1 under the dominance relation on trials three and four, and at the .05 level for Structure 3 under the dominance relation on trials three and four and for

FIGURE 4 MEAN NUMBER OF ERRORS OF COMPLEX AND NONCOMPLEX SUBJECTS

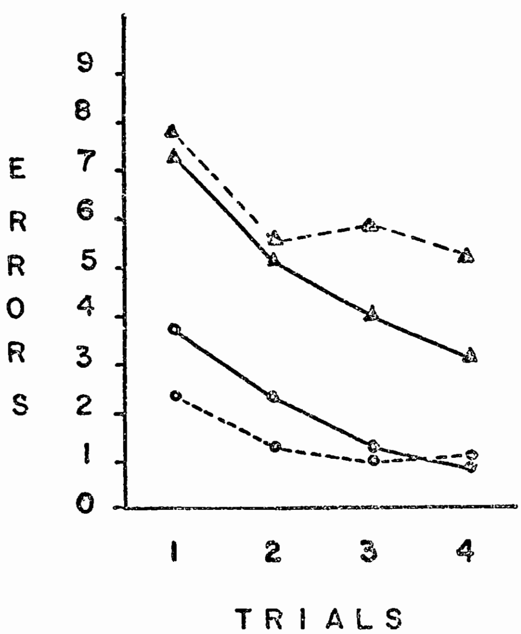


Figure 4a Structure 1

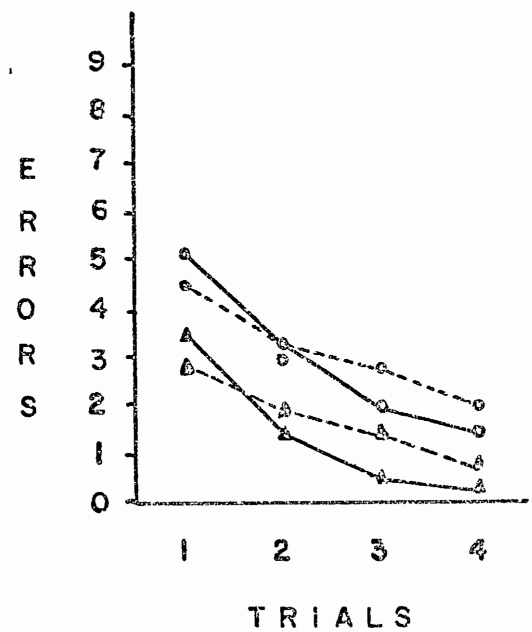


Figure 4b Structure 2

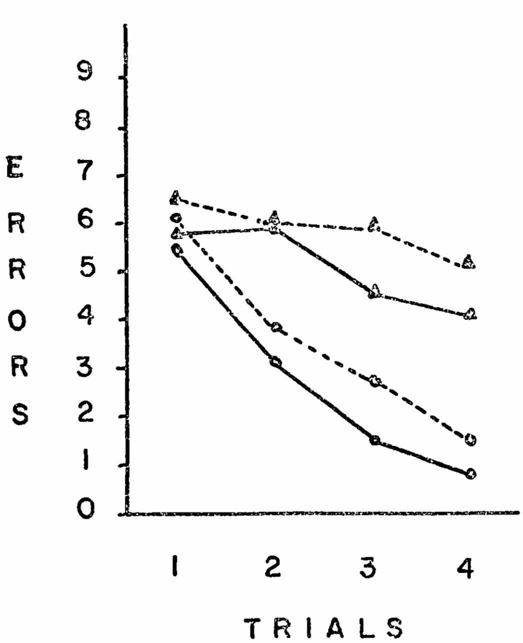


Figure 4c Structure 3

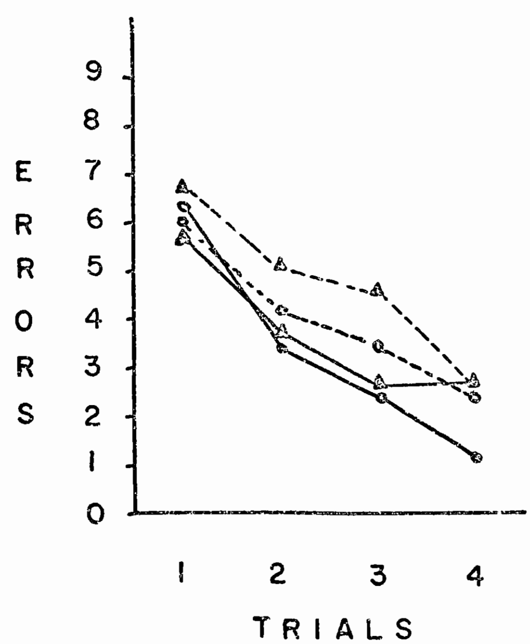


Figure 4d Structure 4

Likes, Noncomplex o ------------o

Dominance, Noncomplex △--------△

Likes, Complex o————————o

Dominance, Complex △————————△

Structure 4 under the likes relation on trials three and four and under the dominance relation on trials two and three.

CHAPTER IV: DISCUSSION

The results summarized in the last chapter are discussed below relative to the two major objects of investigation: (1) the effect of schemas on the rate of learning and (2) the effect of complexity on the rate of learning. In a final section some implications for further research are suggested.

The Effect of Schemas on the Rate of Learning

The results produced by the investigation provide impressive evidence in support of the expected role of cognitive schemas in social perception. Indeed, the utilization of organizing schemas in constructing the pattern of a social structure seems unequivocally indicated in the fact that errors were patterned across pair relations according to their congruence with the schema appropriate to a particular relation. While this and other results are discussed in detail later, the minimum conclusion suggested is that when a subject is called upon to learn the relationships holding within a group, he is guided, at least in part, by his schema or expectation of the overall organization of the set of relations. Apparently for the liking and dominance relations, a notion of the total patterning of such relationships is learned early and carried over as a cognitive map or schema which then directs and guides the learning of social structures based on that relation.

The Balance Schema

The results in this study strongly suggest that the schema for the liking relation is based, at least in part, on the notion of balance as developed by Heider (1946; 1958). That is, when first learning the likes relations among the members of a group, an individual expects those relations to follow the balance principle. Hence, until he clearly learns otherwise, in constructing the total structure of the group relations he relies on the balance hypothesis as an organizing construct.

This conclusion is indicated by several results. First, and most persuasively, the fact that many more errors were made on the relation pair involved in two unbalanced triplets of Structure 3 indicates clearly that the subjects were attempting to construct the completed structure congruent with the balance schema. It is extremely difficult to explain this result in any other way. First, since both the relations in the unbalanced triplets are positive (while the relations for the pair in the balanced triplets are negative), the result cannot be explained by appealing to the biasing source of positivity evident in several previous studies (Zajonc and Burnstein, 1965a; Zajonc and Burnstein, 1965b, Zajonc and Sherman, 1967; Rodrigues, 1968; Crockett, 1969; Rubin and Zajonc, 1969, Press, Crockett, and Rosenkrantz, 1969). Indeed the result indicates that in this study the balance schema was so strong as to overcome the cognitive bias resulting from the fact that positive relations are more easily learned than negative relations.

Further, the structural properties of transitivity and symmetry exist concretely in the structure and are identical for Structure 3 under both the likes and dominance relations. The errors, however, are patterned according to the balance principle only for the likes relation. There was no similar pattern to the errors when Structure 3 was learned under the dominance relation; an approximately equal number of errors were made on all the relation pairs. Balance is an abstract quality and, as Press, Crockett, and Rosenkrantz (1969) note, "a subject's adoption of the balance hypothesis must grow out of his own social experience, not out of the concrete relations in a particular structure" (p. 550). The balance principle thus functions as an organizing construct or perceptual pattern which provides one with an understanding of his social world. It is, in short, a schema.

The role of the balance schema, specifically shown in the pattern of errors produced in learning Structure 3, is evidenced in a more general fashion in the overall Structure x Relation interaction. This result shows just as conclusively the effect of the match or mismatch of relation and structure for the likes relation. Structure 1, the balanced structure, incurred by far the fewest errors. However, the next fewest number of errors were made under the liking relation on Structure 2, the completely unbalanced structure, rather than on Structure 3, the partially balanced structure. This seeming paradox supplies evidence concerning when the balance schema is applied and when it is abandoned. Apparently the partial confirmation of the balance hypothesis in Structure 3--in the fact that all relations between pairs were symmetrical--caused the subjects, especially non-complex ones, to cling to the balance schema even when it did not fit the overall structure. When the hypothesis was disconfirmed at the level of pair relations, as in Structures 2 and 4, the balance principle was rather quickly abandoned and some other organizing principle was sought. Support for this interpretation is supplied both by the analysis of the error-pattern for Structure 3 as discussed above and in the nonlinear learning curve for Structure 2 under the likes relation.

Taken together, then, these results supply strong support for the expectation, as stated in Chapter I, that the balance principle functions as a schema affecting the learning of structures based on the likes relation. This strong evidence for the effect of structural balance extends the similar results reported by Press, Crockett, and Rosenkrantz (1969). Their results and those of this study are in basic conflict with the results reported by Zajonc and his associates (Zajonc and Burnstein, 1965b; Zajonc and Sherman, 1967; Rubin and Zajonc, 1969) indicating very little evidence of the effect of balance in learning social structures. Press, Crockett, and Rosenkrantz (1969) have already discussed some of the possible reasons for the differences in results; however, they deserve repetition and extension here.

First, and probably most important, the subjects' tasks were quite different in the two sets of experiments. Subjects in the studies of

Zajonc and his associates received several structures--as many as eight--during a single learning trial. Furthermore, the subjects were told only that they were to learn pair relations; they were not told that they were learning social structures. By contrast, subjects in the present experiment were presented with only one social structure and were clearly instructed to learn the relations holding among the members of a group. If, as has been suggested, the balance principle constitutes a schema of social structures, it seems likely that the schema would be much more readily applied in this study than in those of Zajonc and his associates.

Second, the structures used by Zajonc and his associates included, along with likes-dislikes relation, attitudes toward social issues and/or the don't know relation. Germane to the first of these differences is the finding of Crockett (1969) that when subjects rate social situations on an uneasy-pleasant dimension the balance principle accounts for much greater variance in structures involving only people than in structures involving both people and issues. If this difference carries over from the pleasantness to the expectation dimension, it suggests at least the possibility that the balance schema would be applied more readily in the present study where all elements in the configuration were people. A similar difference could also have been produced via the inclusion of the don't know relation since, as I have argued earlier, the balance schema seems uniquely utilized in learning structures based on the likes relation.

Finally, as Press, Crockett, and Rosenkrantz (1969) argue, the difference in the two sets of experiments could be attributable to differences in subject selection since (as is discussed below) cognitively noncomplex subjects are more prone to apply the balance schema. Subjects in the present study were not self-selected, while those of Zajonc and his associates were self-selected paid volunteers. It is possible that the self-selected subjects were cognitively complex and, hence, less likely to rely on the balance schema.

In summary, then, the results in the present study provide substantial support for the proposition that a conception of structural balance functions as an organizing schema which effects the rate at which the relations comprising a social structure are learned. The difference in the results of this study and others which have failed to find a similar effect seem adequately attributable to methodological differences.

The Linear-Order Schema

Just as the results suggest the appropriateness of talking about a "balance schema," so they reflect the operation of a single linear-order schema for the dominance relation. The discovery that the learning of social structures based on such relations as dominance and influence is much easier when the structure follows a linear-order is, of course, not original with this investigation. DeSoto and his associates have given extensive consideration to this phenomena (see, for example, DeSoto, 1960; DeSoto, 1961; DeSoto and Albrecht, 1968a;

DeSoto and Albrecht, 1968b). The present investigation, however, does add to the previous results, especially regarding the interpretation of this result as reflecting the functioning of a cognitive schema.

That subjects perceptually construct the total structure of dominance relations congruent with a single linear-order schema is made abundantly evident in the patterning of errors made in learning Structure 4. For the dominance relation, the analysis of variance showed a highly significant result reflecting many more errors on the relation pair involved in two nonlinear-ordered triplets. Fewest errors were made on the pair involved in two linear-ordered triplets. This pattern did not appear in the learning of Structure 4 under the likes relation.

This result parallels in even stronger fashion the result in the learning of Structure 3. Just as the application of the balance principle seems to have guided subjects in constructing a complete liking structure, so the single linear-order principle seems to be the organizing construct for dominance structures. When a set of dominance relations are confronted, the subject has at his disposal a readily available schema which aids him in organizing and learning such relations. When the appropriateness of this schema is indicated via the presence of anti-symmetrical pair relations, the subject utilizes it in attempting to construct the overall structure; hence the greater number of errors on the specific relation pair deviating most from the schema.

The operation of a linear-order schema is further shown in the learning rates for the Structure x Relation combinations. The difference in the learning rates for the linear-ordered and balanced structures (Structures 2 and Structure 1, respectively) under the dominance relation is little short of remarkable---an average of 2.85 vs. 5.59 errors across the four trials. This difference, reflected in the very significant Structure x Relation interaction, clearly gives evidence that a conception that dominance structures are complete linear-orders facilitated the learning of Structure 2 and greatly inhibited the learning of Structure 1.

One final point concerning the linear-order schema indicated by the analyses is its extraordinary power. The greater strength of the linear-order schema, as over against that of the balance schema, is clearly evidenced in the very significant difference in the rates at which Structures 1 and 2 were learned under the likes and dominance relations. The comparisons of these learning rates showed that fewer errors were made under the dominance than under the likes relation when structure and relation were matched. Subjects thus seem to be more prone to adopt the linear-order schema with a consequent greater facilitation of learning. On the other hand, when structure and relation were mismatched, significantly more errors were made under the dominance relation (especially for Trial 1), reflecting the fact that subjects were more likely to apply and cling to the linear-order schema even when it was completely inappropriate. This is not to say that the balance schema was not adopted and did not have an effect on the learning of likes relationships, because it clearly did. Rather it is an indication of the comparatively greater likelihood that subjects will rely on the linear-order schema in learning dominance relationships.

This conclusion concerning the strength of the linear-order schema is further indicated in the significant Relation x Trials and Structure x Relation x Trials interactions. These interactions primarily reflect the fact that the rate of improvement across trials under the likes relation was much greater in its mismatched configurations (Structures 2 and 4) than was the rate of improvement under the dominance relation in its mismatched configurations (Structures 1 and 3). Even further the partial confirmation of the linear-order schema in Structure 4 did not facilitate the learning of that structure under dominance nearly as much as symmetry apparently facilitated the learning of Structure 3 under liking. The expectation of a complete order interfered with learning the intransitive dominance relations of Structure 4 much more than the expectation of balance interfered with learning the intransitive liking relations of Structure 3. In the same way the expectation of the complete order in Structures 1 and 3 under dominance seems to have greatly interfered with learning so as to produce the significant interactions involving Trials. The linear-order schema apparently is of such force that it is not easily disconfirmed.

It appears, then, that the expectation of complete linear-ordered dominance structures is nearly ubiquitous in our culture. Confronted with a group of dominance relations, an individual is extremely likely both to expect to find a complete order and to continue, even after multiple learning attempts, to construct the structure of relations in terms of a complete linear-order.

The Effect of Complexity on the Rate of Learning

The second focus of this study was on the differential expectations which subjects differing in cognitive complexity bring to the learning situation. The analysis, it will be recalled, showed two major significant results involving complexity deserving extended discussion: a main effect showing that overall complex subjects made fewer errors than noncomplex subjects and a significant Complexity x Trials interaction reflecting that noncomplex subjects do as well or better on early trials with complex subjects performing better on later trials. In discussing these results complex and noncomplex subjects' differential reliance on the balance and linear-order schemas are first discussed separately. This is followed by a general discussion of cognitive complexity and the functioning of social schemas.

Complexity and the Balance Schema

The differences between complex and noncomplex subjects in learning Structures 1 and 3 under the liking relationship are strikingly parallel to those obtained by Press, Crockett, and Rosenkrantz (1969). It seems clear, as the Newman-Kuels test comparing complex and noncomplex subjects shows, that noncomplex subjects were more prone to adopt the balance schema. When the schema was appropriate as in Structure 1, they made fewer errors on initial trials than did complex subjects. When the balance schema was partially confirmed in Structure 3--by the presence of symmetric relations between pairs, within a structure that was unbalanced overall--noncomplex subjects were more inclined than complex ones to cling to the balance schema as an organizing device. They showed a slower rate of learning, in consequence. By contrast, when the balance schema was disconfirmed at the level of pair relations --as in Structures 2 and 4, where all relations between pairs were anti-symmetrical--both complex and noncomplex subjects appeared to abandon the balance schema rather quickly; for both types of subjects the number of errors dropped rather sharply over trials, though complex subjects performed consistently more effectively than noncomplex ones.

Complexity and the Linear-Order Schema

In Chapter I the expectation that noncomplex subjects would also be more prone to adopt the linear-order schema was expressed. This expectation was not supported by the data. Though noncomplex subjects made somewhat fewer errors on the initial trial in learning Structure 2 under the dominance relation, the difference did not approach significance. In the other configurations involving the dominance relation, complex and noncomplex subjects performed similarly on the early trials.

That a differential reliance on the linear-order schema did not result in faster initial learning of Structure 2 under the dominance relation by noncomplex subjects may reflect the fact, discussed above, that a linear-order schema for dominance is a more powerful schema than is the balance hypothesis, whatever the subjects' level of complexity. Both complex and noncomplex subjects made an extraordinarily large number of errors on the first trial when the balanced structure was learned under the dominance relation. Beyond this, as noted above, for both complex and noncomplex subjects more errors were made when dominance did not match the intransitive relations of Structure 4 than when liking did not match the unbalanced relations of Structure 3. It appears, then, that complex subjects were as likely as noncomplex subjects to adopt the powerful linear-ordering schema for dominance, so that the expected differences in the initial number of errors on Structure 2 were not obtained.

There were, however, differences between complex and noncomplex subjects in their reliance on the linear-order schema. No matter how quickly the schema was adopted, when it did not work it was abandoned more rapidly by complex subjects than by noncomplex ones, as witness their faster rates of learning Structures 1, 3, and 4 under the dominance relation. The Newman-Kuels comparison shows that for each of these structures complex subjects made significantly fewer errors by the third trial. As the main effect for complexity in the analysis of Structure 4 under dominance reflects, complex subjects consequently made fewer errors across the four trials in learning these structures. Thus, while noncomplex subjects are no more prone than complex subjects to adopt the linear-order schema, they are more reluctant to abandon the schema as inappropriate.

Complexity, Schemas, and Social Perception

The difference in the construction (perception) and subsequent learning of social structures by subjects differing in cognitive complexity has some important theoretical implications for social perception. The data implies, at the least, that the process of social perception can be conceptualized as fitting a constructivist epistemology. Social stimuli take on meaning as they are ordered within cognitive dimensions such as constructs or schemata; hence in the present study those configurations which matched a social schema were more easily learned.

It will be recalled from Chapter I that Piaget suggests the two basic operations via which this construction process occurs are assimilation and accommodation. In assimilation the object of perception is construed in terms of the cognitive schema. In accommodation the schema is modified, permitting a more penetrating construction of the object in itself. These two processes, particularly assimilation, appear to have been operative in the present study. As the previous discussion of results suggests, the social schema functioned so as to guide the construction of the structure; that is, the relations were assimilated to the schema. When the schema, once applied, was abandoned, there was accommodation to the nature of the object itself. Social perception, then, is a function of both structures within the perceiving organism and the particular qualities of the perceptual object. Out of the interplay of these two forces, a construction of the object emerges.

A crucial question in considering the role of schemas in perception, as it operated in this study, seems to be, how does accommodation come about? That is, how is it that a schema becomes modified so that a fuller, more complete, construction of the object in itself is made? It is at this point that our discussion meets the concept of cognitive complexity.

Cognitive complexity, as operationalized in this study, it will be recalled, is a measure of the differentiation of an individual's system of interpersonal constructs. Crockett (1965), following Werner's (1957) orthogenetic conception of development, argues that an individual's level of complexity is a function of his experience with social objects. As an individual comes to have wider and more varied experience with social objects he makes finer distinctions between them and increases his ability to represent these objects (be they people or social structures) in more diffuse and complex ways. There is a movement with experience from relative globality to greater differentiation.

If constructs and schemas are similar cognitive structures via which external objects are construed, as was suggested in Chapter I, the fact that subjects differing in complexity, as measured in this study, differentially utilized particular social schemas should not be surprising. What the results suggest, perhaps, is that complex subjects possess more differentiated schemas. In the case of the balance schema the results seem to indicate that for complex subjects the "original" schema no longer was the central one in its cluster, and hence was not applied first. Thus in learning the balanced liking structure, noncomplex subjects, who apply a relatively undifferentiated balance schema, outperformed the complex subjects. The powerful ordering schema, on the other hand, was applied initially by both complex and noncomplex subjects. The complex subjects, however, possessing a more differentiated ordering schema, were able to accommodate to the nonlinear-ordered structures much more readily than the noncomplex subjects.

This understanding of the difference in performance of complex and noncomplex subjects becomes especially persuasive when the manner in which these types of subjects have performed in impression formation tasks is examined. As was noted in Chapter I, a significant number of studies (Mayo and Crockett, 1964; Nidorf and Crockett, 1965; Rosenkrantz and Crockett, 1966; Meltzer, Crockett, and Rosenkrantz, 1966; Kenny, 1968; Crockett, Gonyea, and Delia, 1970) have shown that when subjects are presented with potentially conflicting information about another person, the noncomplex subjects are more likely than complex subjects to reject one side of the information and/or to form a univalent impression or an impression in which the conflicting information is not overtly reconciled. Complex subjects thus come to the interpersonal situation with a more highly differentiated set of constructs than do noncomplex subjects. This more highly differentiated system allows them to construct social objects in more complex ways. It is this same kind of difference, apparently, that is operating when these subjects have less difficulty in learning social structures that do not fit any simple social pattern.

This discussion might suggest that complexity is functional and noncomplexity dysfunctional. As Press, Crockett, and Rosenkrantz (1969) have noted, however, such is not necessarily the case. Noncomplex subjects learned the social structures fitting their simple schemas as fast or faster than complex subjects. The real difference in the subjects are in the processes via which they approach the task (Werner, 1937). Complex subjects possess greater flexibility due to the more fully articulated system of dimensions they possess for understanding social objects. But this does not guarantee them greater success. Many social structures either fit simple social schemas or can be treated as if they did; hence, noncomplexity is often more functional than complexity.

In summary, then, the results showing differential learning rates for complex and noncomplex subjects help in clarifying the basic process of social perception. These results suggest strongly that that process is one of construction. Confronted with a social object an individual "makes sense" of it by construing or assimilating it to existing cognitive structures (constructs or schemas). The results further demonstrate that individuals differing in cognitive complexity operate differently in this construction process.

Some Implications for Research

This study points to several lines of research which present avenues for the further investigation of the role of schemas in social perception. Three such lines of research are discussed in the following paragraphs.

First, the operation of cognitive complexity as it interacts with the reliance on social schemas seems to merit further consideration. For example, is the analysis presented above of the differentiated nature of complex subjects' schemas an accurate interpretation? Do subjects who differ drastically in complexity use the linear-order schema differentially in initially construing a social structure? There is some indication to this effect in the present study in the fact that noncomplex subjects made fewer, though not significantly less, errors on the initial trial for the linear-ordered structure. Further, the present investigation has identified distinguishable patterns in the way complex and noncomplex subjects differ in their reliance on the balance and ordering schemas. Do complex and noncomplex subjects use other schemas, e.g., the grouping schema (DeSoto, Henley, and London, 1968), in still different patterns? All these points and questions indicate a fertile area for further research.

Second, further research comparing the strength of various schemas seems warranted. For example, is the single-order schema for influences as strong as for the dominance relation? Is the symmetric confides in schema stronger than the expectation of symmetry in liking relations? The comparison of the strength of such schemas should go a long way in indicating how important each is.

Finally, the discussion in the last section concerning the development, differentiation, and change of schemas appears an area justifying serious investigation. First, the utilization of schemas by children of differing ages could be examined. When do social schemas develop? What kind of experiences contribute to their development? How closely are they tied to language? Second, how do schemas change? The previous discussion indicated that perhaps they move from globality to differentiation. Is this accurate? Do twelve year olds have a clearer less differentiated balance schema than our college-age subjects? Does conflict play any part in the change of schemas? Piaget's (1963) conflict or equilibration model, though heretofore applied mainly to the development of logical operations (see Feffer, 1970), would seem to suggest that a schema repeatedly confronted with a highly incongruent social structure would change. Would it? If so, would the change be permanent or transitory? There clearly are important questions remaining concerning the development and change of social schemas.

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Appendix A:

Role Category Questionnaire

ROLE CATEGORY QUESTIONNAIRE

Name ______________________________ Date _______________ Sex __________

Instructor _______________________ Class Time _________________________

Our interest in this questionnaire is to learn how people describe others whom they know. We are interested in knowing, in your own terms, the characteristics which a set of individuals have--those which set one person off from another as an individual, and those characteristics which they share in common.

Our concern here is with the habits, ideas, mannerisms--in general, with the personal characteristics, rather than the physical traits--which characterize a number of different people.

In order to make sure that you are describing real people, we have set down a list of four different categories of people. In the blank space beside each category below, please write the initials, nicknames, or some other identifying symbol for a person of your acquaintance who fits into that category. Be sure to use a different person for each category.

1. A man your own age whom you like _______________
2. A man your own age whom you dislike _____________
3. A woman your own age whom you like ______________
4. A woman your own age whom you dislike ___________

Spend a few moments looking over this list, mentally comparing and contrasting the people you have in mind for each category. Think of their habits, their beliefs, their mannerisms, their relations to others, any characteristics they have which you might use to describe them to other people.

If you have any questions about the kinds of characteristics we are interested in, please ask them.

Do not turn the page until instructed to do so.

Please look back to the first sheet and place the symbol you have used to designate the person in category 1 here ___________.

Now describe this person as fully as you can. Write down as many defining characteristics as you can. Do not simply put down those characteristics that distinguish him from others on your list, but include any characteristics that he shares with others as well as characteristics that are unique to him. Pay particular attention to his habits, beliefs, ways of treating others, mannerisms, and similar attributes. Remember, describe him as completely as you can, so that a stranger might be able to determine the kind of person he is from your description. Use the back of this page if necessary.

This person is

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Please look back to the first sheet and place the symbol you have used to designate the person in category 2 here __________.

Now describe this person as fully as you can. Write down as many defining characteristics as you can. Do not simply put down those characteristics that distinguish him from others on your list, but include any characteristics that he shares with others as well as characteristics that are unique to him. Pay particular attention to his habits, beliefs, ways of treating others, mannerisms, and similar attributes. Remember, describe him as completely as you can, so that a stranger might be able to determine the kind of person he is from your description. Use the back of this page if necessary.

Please look back to the first sheet and place the symbol you have used to designate the person or category 3 here ________.

Now describe this person as fully as you can. Write down as many defining characteristics as you can. Do not simply put down those characteristics that distinguish her from others on your list, but include any characteristics that she shares with others as well as characteristics that are unique to her. Pay particular attention to her habits, beliefs, ways of treating others, mannerisms, and similar attributes. Remember, describe her as completely as you can, so that a stranger might be able to determine the kind of person she is from your description. Use the back of this page if necessary.

Please look back to the first sheet and place the symbol you have used to designate the person in category 4 here ___________.

Now describe this person as fully as you can. Write down as many defining characteristics as you can. Do not simply put down those characteristics that distinguish her from others on your list, but include any characteristics that she shares with others as well as characteristics that are unique to her. Pay particular attention to her habits, beliefs, ways of treating others, mannerisms, and similar attributes. Remember, describe her as completely as you can, so that a stranger might be able to determine the kind of person she is from your description. Use the back of this page if necessary.

Appendix B:

Sample Experimental Task Booklet

Name: ____________________

Instructor: ______________

Age: ________ Sex: __________

LEARNING SOCIAL RELATIONS

Your task in this experiment is to learn about the relations among a set of people. You will be given one minute to read about these relationships for a set of people and then one and one-half minutes to recall this information.

You will be given four trials; each trial will consist of reading the information sheet and then, on my signal, recording your answers on the following sheet. On each of the four trials the same information and answer sheets will be presented.

As you proceed from trial to trial you should recall more and more of the information.

Study the Following Relations for One Minute

Dave dislikes Stan

Stan likes Bill

John likes Dave

John dislikes Stan

Dave dislikes Bill

Bill likes Stan

Stan dislikes Dave

Dave likes John

John likes Bill

Bill dislikes Dave

Bill likes John

Stan dislikes John

Circle the Appropriate Response

Bill . . . . . likes, dislikes . . . . . Stan

Stan . . . . . likes, dislikes . . . . . John

John . . . . . likes, dislikes . . . . . Dave

John . . . . . likes, dislikes . . . . . Stan

Dave . . . . . likes, dislikes . . . . . Bill

Bill . . . . . likes, dislikes . . . . . John

Stan . . . . . likes, dislikes . . . . . Dave

Dave . . . . . likes, dislikes . . . . . John

John . . . . . likes, dislikes . . . . . Bill

Bill . . . . . likes, dislikes . . . . . Dave

Dave . . . . . likes, dislikes . . . . . Stan

Stan . . . . . likes, dislikes . . . . . Bill

Study the Following Relations for One Minute

Dave dislikes Stan

Stan likes Bill

John likes Dave

John dislikes Stan

Dave dislikes Bill

Bill likes Stan

Stan dislikes Dave

Dave likes John

John likes Bill

Bill dislikes Dave

Bill likes John

Stan dislikes John

Circle the Appropriate Response

Bill . . . . . likes, dislikes . . . . . Stan

Stan . . . . . likes, dislikes . . . . . John

John . . . . . likes, dislikes . . . . . Dave

John . . . . . likes, dislikes . . . . . Stan

Dave . . . . . likes, dislikes . . . . . Bill

Bill . . . . . likes, dislikes . . . . . John

Stan . . . . . likes, dislikes . . . . . Dave

Dave . . . . . likes, dislikes . . . . . John

John . . . . . likes, dislikes . . . . . Bill

Bill . . . . . likes, dislikes . . . . . Dave

Dave . . . . . likes, dislikes . . . . . Stan

Stan . . . . . likes, dislikes . . . . . Bill

Study the Following Relations for One Minute

Dave dislikes Stan

Stan likes Bill

John likes Dave

John dislikes Stan

Dave dislikes Bill

Bill likes Stan

Stan dislikes Dave

Dave likes John

John likes Bill

Bill dislikes Dave

Bill likes John

Stan dislikes John

Circle the Appropriate Response

Bill . . . . . likes, dislikes . . . . . Stan

Stan . . . . . likes, dislikes . . . . . John

John . . . . . likes, dislikes . . . . . Dave

John . . . . . likes, dislikes . . . . . Stan

Dave . . . . . likes, dislikes . . . . . Bill

Bill . . . . . likes, dislikes . . . . . John

Stan . . . . . likes, dislikes . . . . . Dave

Dave . . . . . likes, dislikes . . . . . John

John . . . . . likes, dislikes . . . . . Bill

Bill . . . . . likes, dislikes . . . . . Dave

Dave . . . . . likes, dislikes . . . . . Stan

Stan . . . . . likes, dislikes . . . . . Bill

Study the Following Relations for One Minute

Dave dislikes Stan

Stan likes Bill

John likes Dave

John dislikes Stan

Dave dislikes Bill

Bill likes Stan

Stan dislikes Dave

Dave likes John

John likes Bill

Bill dislikes Dave

Bill likes John

Stan dislikes John

Circle the Appropriate Response

Bill . . . . . likes, dislikes . . . . . Stan

Stan . . . . . likes, dislikes . . . . . John

John . . . . . likes, dislikes . . . . . Dave

John . . . . . likes, dislikes . . . . . Stan

Dave . . . . . likes, dislikes . . . . . Bill

Bill . . . . . likes, dislikes . . . . . John

Stan . . . . . likes, dislikes . . . . . Dave

Dave . . . . . likes, dislikes . . . . . John

John . . . . . likes, dislikes . . . . . Bill

Bill . . . . . likes, dislikes . . . . . Dave

Dave . . . . . likes, dislikes . . . . . Stan

Stan . . . . . likes, dislikes . . . . . Bill