A STUDY OF THE GENERALIZATION OF

CHANGES WITHIN

THE PERSONAL CONSTRUCT SYSTEM

Dissertation

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CHAPTER I

HISTORICAL REVIEW

Introduction to the General Problem

A fundamental postulate of the psychology of personal constructs is that a person's psychological processes evolve toward what he considers to be a more optimal anticipation of events. Rephrased, we may say that a person is continually involved in the process of improving his prediction and understanding of his meaningful environment. The vehicle for his understandings and his predictions concerning other people are his personal constructs. These constructs are assumed to be the characteristic modes of perceiving individuals in the person's environment. They are formed by abstracting a way in which two individuals are alike and different from a third. Predictions are made concerning others' behavior, results from these predictions are experienced, and changes in the construct system may ensue. The predictions may be validated, or they may be invalidated, or the outcome may be equivocal.

The research presented here is concerned with predictions about behavior which are validated and invalidated,
and involves the general question: What occurs in the rest of a person's construct system when invalidation or validation occurs with respect to one part of the system following prediction? There are at least three ways in which this problem can be approached.

(1) The hierarchical organization of the constructs can be studied. That is, constructs are assumed to fall into subordinate and superordinate subsystems. The superordinate constructs manifest an inclusive, organizing effect over the subordinate constructs, the latter existing at a lower level or organization. The notion of superordinate-subordinate subsystems of constructs is perhaps analogous to the relationship of values and attitudes in attitude theory. Values are conceived as being at a higher level of organization and encompass many attitudes which are more specific and conceptually less inclusive than values. Theoretically, then, several hypotheses could be generated concerning changes in the superordinate-subordinate construct relationship and the effect of change in this relationship on the construct system as a whole. First, because the superordinate constructs encompass more aspects of the total system used in predicting and obtaining understanding of the meaningful environment, it could be hypothesized that these superordinate constructs will be more resistant
to change in the face of invalidation than will the subordinate constructs. Secondly, and related to the preceding point, it would be hypothesized that a shift in a superordinate construct or subsystem will be more marked in its effect on the rest of the system than will a change in a relatively subordinate construct or subsystem.

(2) Constructs have different characteristics, and each type may be expected to have different properties in respect to ease of change and the effect of this change. Thus, preemptive, propositional, permeable, impermeable and constellatory constructs could be expected to act differentially in regards to their effects on the entire construct system if any one of them were changed. For example, Kelly (11) conceives of a preemptive construct as one which exists in relative isolation from other constructs in the system, and a change in such a construct may therefore have little effect on the rest of the system. On the other hand, a constellatory construct in the psychology of personal constructs only exists in relationship to other constructs, and a change in such a construct may have considerable effect on the rest of the system.

(3) A third, and conceptually less complex way of approaching the problem of the effect of change in the
construct system, is to consider the system as having two fundamental properties: (a) figures or persons existing in the individual's life space and (b) role constructs used in understanding and predicting the behavior of the persons. Obviously, these two aspects of the system are interrelated, i.e., constructs represent abstractions from figures, and figures can only be perceived in terms of constructs.

What this means for the present research is that we may ask the questions: How are persons perceived along construct dimensions? Also: How are constructs applied to particular figures? Thus, we have construct dimensions along which persons are construed, and figure dimensions along which constructs are applied. The purpose of this research is to predict the effect of the change in one construct dimension on other construct dimensions in the system, and to predict the effect of the change in one figure dimension on other figure dimensions in the system. The concept of generalization will be employed in making predictions about the effects of these changes on the rest of the construct system.

Generalization as a Psychological Concept

The concept of generalization has been invoked by psychologists to account for consistencies in behavior patterns from one set of conditions to another which appear to
be related along some dimension of similarity. The work of Pavlov (13) in conditioning dogs to tones has provided some of the earliest data for generalization. He observed that once a dog has been conditioned to a certain tone, the conditioned response tends to be evoked by other tones similar to the original tone. Working in a physiological setting, Pavlov used the concept of "irradiation" to explain this phenomenon, referring by this to a hypothesized wave-like spread of cortical stimulation to adjacent areas of the brain. This cortico-physiological explanation of generalization carried with it several implications.

First, it conceived of generalization as existing along a dimension of continuous quantitative physical similarity. Further, it implied that this dimension is an unlearned, physiologically given characteristic of the organism. Both of these implications found their way into subsequent psychological formulations of generalization, and indeed exist today in varying degrees in conceptualizations of generalization.

Bass and Hull (1) exemplify the influence of Pavlov in a published study entitled "The irradiation of a tactile conditioned reflex in man." In this early study, eight subjects were conditioned to tactile stimulation, following
which the conditioned response was tested at 16, 32 and 48 inches from the conditioned spot. There was a gradient of decreased response along the dimension of increased distance of each generalization spot from the conditioned spot.

Hovland's frequently-cited study (7), involving the generalization of conditioned galvanic skin-response to tones, provided part of the basis for Hull's formulations concerning generalization (9). Using an electric shock as his unconditioned stimulus, Hovland trained subjects to one tone and then tested to tones differing in multiples of 25 just noticeable differences from the training tone. Hovland used two dimensions of generalization. One was the frequency of the tone, the other the intensity of the tone. Testing at three points of progressive dissimilarity to the training tone, he obtained a gradient characterized by Hull (9) as "a monotonic decreasing function of the magnitude of the differences between the conditioned stimulus and the unconditioned stimuli."

The above studies, and others of a similar vein, have come to be designated as being concerned with primary stimulus generalization. The essential conditions of this type of generalization are the establishment of a conditioned response to a conditioned stimulus, and subsequent presentation of stimuli related on some dimension of similarity to
the conditioned stimulus so as to evoke the conditioned response. Important to note about these studies are (1) they imply a continuous quantitative generalization dimension in terms of physical similarity, (2) these dimensions are essentially unlearned, (3) the dimensions are selected by the experimenter and imposed upon the subject.

Recurrent criticism of the notion of primary stimulus generalization has appeared in the psychological literature. Lashley and Wade (12) have been particularly critical of the idea of the physically given dimensions of stimulus similarity. They state that Pavlov's followers (Hull) ...

"have been forced to make the assumption that degree of similarity is a direct function of the quantitative physical relations of the stimulus objects. This assumption is not explicitly stated but is implied on all discussions where degree of similarity is expressed as distance on the physical continuum."

"The assumption is, however, negated by every item of evidence. Degree of similarity is a product of the activity of the organism, not a physical property."

Although stressing the learned nature of stimulus dimensions, Lashley and Wade go to the extreme of identifying generalization as the failure of the organism to observe differences and would thus emphasize the differentiation or discrimination (or lack thereof) as opposed to the generalization aspects of so-called generalized behavior.

Razran (16) has seen fit to retain the concept of
generalization, while agreeing with Lashley and Wade that the Hullian notion of a simple generalization gradient as a function of the differences between the conditioned stimulus and the generalization stimuli may not fit the facts. Razran analyses Hovland's data and points out that the obtained curve is for means only, with no statistically reliable differences between adjacent points. Perhaps more cogent is the observation that 19 of the 20 subjects showed one or more reversals in the predicted gradient, while seven subjects had mean conditioned responses to generalization stimuli greater than the mean conditioned response to the conditioned stimulus. Further, by analyzing the data according to trials, a relatively flat curve is obtained on the first trial, indicating generalization may be a kind of resistance to extinction. It seems reasonable to conclude that at this juncture the exact nature of the primary stimulus generalization gradient is not entirely clear, nor is there general agreement concerning the explanations of the gradients which are obtained. Razran has suggested a categorization-rating view of generalization which posits that generalization occurs in a step-wise fashion along the stimulus dimension as the organism categories stimuli on a crude similarity-dissimilarity scale. This view of generalization appears to be intermediate between Hull and Lashley.
The concept of response generalization has been set forth by Wickens (22). In contradistinction to stimulus generalization, in which the same response is evoked by different stimuli, response generalization involves the attachment of a group of responses to the same (or very similar) stimulus. In other words, the gradient of generalization is plotted along a dimension of response rather than stimulus similarity. It would appear that the further investigation of this type of generalization might lend understanding to the frequently observed clinical phenomenon of apparently diverse behaviors being elicited by similar stimulus situations.

**Mediated Generalization**

In an attempt to bring generalization gradients into the realm of learned dimensions of behavior, as contrasted with unlearned physical dimensions, the counter-concept of secondary or mediated stimulus generalization has developed. Mediated generalization refers to the assumption that if the individual learns identical ways of responding to different stimuli and if later a new response is learned to one of these stimuli, then that response is attached to other stimuli in the grouping. A special type of mediated generalization is that of semantic generalization. Cofer and
Foley (3) have elaborated the relationship of semantic generalization to verbal behavior, and have identified three kinds of semantic gradient studies.

(1) Experiments in which a conditioned response has been established to a stimulus object and generalization obtained to its name.

(2) Conversely, studies in which conditioned responses have been established to a word and generalization obtained to its object.

(3) Establishment of a conditioned reaction to one word and generalization to other semantically and phonetically related words.

This latter category of studies is felt to be most relevant both to the research at hand and to the theory of personal constructs within which the study is cast. An early study of this type was that of Razran (15) in which three subjects were presented four words (style, urn, freeze, and surf) on a screen while subjects ate and the amount of salivation to the stimulus words, homophones and synonyms was measured. Mean generalization was 59% to synonyms and 37% to homophones.

Riess (17) repeated Razran's study but used galvanic skin response to a loud buzzer as his conditioned response. He found a mean percentage gain of 94.5 for homophones and
In another study (18), Riess included antonyms and different age levels. Results indicate greater generalization to homophones in younger children (mean age 7 - 9) than to synonyms, with antonyms intermediate, while older children (mean age 14 - 0) showed greater generalization to synonyms than to homophones. These results suggest the greater importance of phonetic as compared to semantic factors in younger children.

Using accuracy of recall of an experimental list of words as a measure of generalization, Foley and Cofer (6) found that generalization was greater to one of two lists of homophones than it was to synonyms. Because of this difference in generalization to their two homophone lists, Foley and Cofer feel that the homophone gradient is not a primary or non-mediated one, as Razran had concluded from his earlier work, but rather it is complicated by semantic factors (which are not elaborated by the authors).

It seems reasonable to conclude, then, that in the above studies, the dimension along which generalization occurs is not a dimension characteristic solely of the physical attributes of the stimuli. Rather, they are dimensions in which the subject has had differential learning and has developed meanings. It can be stated that the concept of mediated generalization has overcome the difficulty
of dealing with physically given dimensions found in primary generalization, and that the concept of semantic generalization in particular offers an opportunity to explore the more symbolic, psychologically meaningful aspects of the generalization process.

However, it is evident that an aspect of the primary stimulus generalization view (and of orthodox stimulus-response theory) is still retained in the semantic gradient studies to the extent that the generalization dimensions are given or imposed by the experimenter onto the subject without direct knowledge as to how these dimensions are perceived and defined by the individual subject prior to the testing for generalization. The question of what meaningful dimensions to use is largely a matter of the purposes of the experimenter and the theoretical system within which he is operating. However, the characteristics of the dimensions, in terms of the order, arrangement and degree of functional relatedness or similarity of the constituent elements can only be ascertained from the individual himself. It would seem that general principles need to be formulated at an idiographic level in terms of the subject's own perception or categorization of the elements along the dimension, from which more general nomothetic hypotheses can be derived.
What this would mean for the above experiments is that instead of predicting stronger generalization to either synonym or homophone dimensions, differential predictions are made within each generalization dimension. Thus, specific predictions for synonym generalization of a word could be made once the relative position of the synonyms on the dimension was ascertained for each subject in terms of the perceived similarity, for example, of the synonym word elements to the training word. This procedure would have the advantage of enabling predictions to be made about generalization dimensions which: (1) do not involve or imply continuous quantitative dimensions, but rather enables the experimenter to allow the subject to assign his own quantitative weights of similarity to the elements along the dimension; (2) uses dimensions of a learned psychological nature; (3) uses these dimensions in terms of how they are perceived by the subject.

The present research attempts to meet the above criteria in studying the generalization of change from one part of the construct system to the system as a whole.

**Generalization and Personality Theory**

Although traditionally the concept of generalization has been associated with experimental approaches to psychology, it has been an implicit notion in the development of
theories of personality. Freud, working at about the same time as Pavlov, conceived of the idea of displacement as one of the mechanisms of dream-work and later of ego defense. By displacement, Freud meant the shunting-off of a behavior from one object to another object related to but personally less threatening than the original object. Containing as it did the recognition of the importance of behavior which generalizes along dimensions of object similarity, Freud did not greatly enlarge or systematize the displacement concept in his theory.¹

However, in a certain sense, the generalization concept can be said to underlie a great deal of Freud's theoretical thinking. Thus, the whole area of symbolic behavior may be seen as rooted in generalization. Symbols and symbolic situations (as in phobic reactions) represent events which fall along the gradient of similarity which is anchored at one end to the original event being represented symbolically. The fact that the individual may not be aware of the original event from which his behavior generalized to the symbolic event, represented for Freud an important basis for a person's maladjustment.

¹ For a more extended discussion of displacement and generalization in a behavioral approach, cf. Dollard and Miller (5).
Harry Stack Sullivan has, in the opinion of the writer, developed a theoretical approach to personality which in many particulars makes primary use of the concept of generalization. In his interpersonal theory (20), Sullivan has amplified the Freudian notion of transference. This idea is centered about the observation that the patient transfers onto the therapist patterns of behavior originally developed in relation to a parent (father). Once again Freud has employed the generalization concept in the sense that the analyst and the father fall along certain dimensions of similarity (e.g., both males and authority figures), thereby enabling and promoting the generalization of behavior reactions from the father to the analyst. For Sullivan, this generalization (transference) of behavior was true not only for the therapeutic situation, but for all interpersonal relations. The maladjusted individual reacts to others as if they were persons who were present at an earlier stage of interpersonal experience. Thus his behaviors (which in this instance Sullivan would call parataxic) are likely to be maladaptive because they are fitted to some earlier, now non-existent relationship, and not to the actual on-going situation. These parataxic distortions, then, represent the generalization from a past relationship.
of earlier learned reactions and modes of perceiving which are inappropriate to the present relationship. To the extent that a person could bring these parataxic (generalized) reactions into awareness, to that extent Sullivan felt a more adequate and appropriate adjustment to current relationships could be achieved.

This general point of view would seem to have direct implications for the process of psychotherapy, especially within the framework of the psychology of personal constructs. Through his relationship with the therapist, the patient focuses on his relations with the significant persons in his environment, especially in terms of how he perceives them. In this manner, persons perceived and responded to in similar ways can be thought of as lying along a generalization gradient formed by the common perception. If this mode of perceiving and reacting is causing difficulty in the person's adjustment, one of the tasks of psychotherapy is to bring about a realignment of the perception or to create new perceptions. Much time is often spent on reconstruing one person along the gradient, for example, a parental figure. If this change is accomplished, then it is presumed that the patient's pattern of relationships with the other persons along the original perceptual gradient will change, and also to a lesser extent, his
relationships with people in general.

The present research is analogous to this simplified paradigm of the therapeutic process. A change is brought about in the way a person is construed. The effects of this change on the way others are perceived are studied with particular reference to the effects which might be expected according to certain principles of generalization.

If constructs are conceived as *expectancies*, then the relationship of portions of the present research to Rotter's Social Learning Theory of Personality (19) is apparent. Working within Rotter's framework, Crandall (4) demonstrated the generalization of freedom of movement, which represents a general view of a number of expectancies, along a dimension of need-relatedness. Likewise, Jessor (10) found that changes produces in expectancies generalized along a gradient of functionality of need. Chance (2) employed expectancy statements about performance on tests which led to the same and different reinforcements. She found that generalization of expectancy changes occurred to a greater extent in groups in which the tests were presented as leading to the same reinforcement as compared to groups in which the tests were perceived as leading to different reinforcements. In these studies, a common element
has been the study of the generalization of the individual's expectancies about his own behavior along certain dimensions of need-relatedness. In the present research, the emphasis is rather upon the generalization of expectancies concerning others' behavior along dimensions of perceived similarity. Thus, although the present study is approached from a more perceptual or cognitive orientation, avenues of rapprochement with a more behavioral orientation are apparent.
Essentially, the generalization concept was invoked to explain an empirical finding. The explanations given to this finding have been heavily biased in the Pavlovian tradition, although as we have noted above, there has been a progressive shift of emphasis toward making generalization a more psychological concept, especially in semantic generalization. Here, symbolic processes of the organism are involved, at least in the sense of abstracting, e.g., the similarity of meaning of synonyms. Concurrently, the concept of generalization has been increasingly scrutinized by more perceptually or cognitively oriented workers. As noted previously, Lashley has gone to the extreme of stating that generalization is the failure of the discriminating organism to perceive one set of conditions as distinct from another. This, however, merely seems to be a negative way of saying the organism perceives situations as relatively dissimilar. Even Hull (8), however, has attempted to explain generalization as a process of stimulus discrimination on the part of the organism. What this appears to mean is that
having found that the experimenter's prescribed dimensions produce poor results in terms of the theory, the experimenter then attempts to second-guess the dimensions under which the organism was operating in order to explain the results. Thus, we find behaviorists (cf. Hull's explanation of secondary stimulus generalization (8) stating that the conditioned animal is not only responding to the tone, but to the fact the tone is an event, to the cues of the room, to the loudness, ad infinitum. Gradually the animal learns what the relevant (i.e., experimenter defined) stimulus is, that is, he has discovered what it is the experimenter wishes him to respond to. Tolman (21) has gone furthest in supplying the rat with a set of anthropomorphised hypotheses, but unfortunately the rat lacks the verbal communication to express itself as to the correctness of such hypotheses. The upshot of these trends is an awareness that generalization involves dimensions which the subject imposes upon the test situation which represent ways he has learned to respond to, categorize or perceive this set of events in the past.

An illustration of the confusion which has surrounded this matter of experimenter versus subject defined dimensions is found in the article by Cofer and Foley (3). They state that ... "The (generalization) stimuli need to be
similar only insofar as they have been previously conditioned to the same (or similar) response. Here Cofer and Foley seem to attempt to avoid falling into the trap of Pavlovian generalization in terms of stimulus similarity externally defined. Thus, they state the stimuli need not be similar (for the experimenter) as long as they are attached to the same response (i.e., similar for the subject). They almost appear to be trying to defend the notion that similarity "really" exists, while recognizing (although not explicitly stating) that similarity only exists in terms of some functional equivalence of elements for the organism. In the psychology of personal constructs, two elements are seen as similar only in terms of a likeness and a difference set up by the subject, and the notion of how "similar" the stimuli "really" are is superfluous, if not misleading.

Similarity, then, is inherent in the concept of generalization. It refers to the abstracted property of two elements or stimuli such that the individual responds equivalently to the elements. The concept of similarity as it has been used in generalization then is as follows:

(a) **Primary Generalization**: Experimenter defined similarity on a physical gradient.

(b) **Mediated Generalization**: Experimenter defined similarity on a psychological gradient.
(c) **Perceptual Generalization**: Subject defined similarity on a psychological gradient.

Seen in this light, generalization as a process is basic to the psychology of personal constructs. The constructs used by the individual in construing and predicting his world are formulated by a process of abstracting from two elements a similarity, and differentiating this abstraction from a third element perceived as being dissimilar. Thus, the psychology of personal constructs goes further than mediated generalization (and conventional concept-formation theory) by stipulating that not only must a similarity be abstracted, but that this similarity must stand in opposition to a third element which is different. In other words, the limits of the generalization are set by the subject as he engages in the process of construing (generalizing). In effect, he is setting up a realm of elements along a dimension varying from most similar to least similar to the abstracted (mediated) gradient. Lashley (9) has explicitly recognized this when he states: "The development of a scale of similarity, the discovery of a stimulus dimension ... requires both the recognition of similarity and of direction and degree of difference."

Constructs, then, can be conceived as generalization gradients with limits, fixed by the subject, of greatest
similarity and dissimilarity to the elements from which they were formed. Each construct represents a dimension which the individual erects and then uses to abstract meaning from an event so as to anticipate and predict the outcomes or consequences of that event. The aggregate of elements or events which make up the construct dimension are thus seen to be ordered on a scale of similarity-dissimilarity which we now equate as having been abstracted or generalized from the constituent elements. Thus, within the framework of the psychology of personal constructs, we can assert that construction of events and generalization of events are identical processes as they are carried on by the individual.

The Matrix Method

Thus far, we have considered generalization as synonymous with the formation or abstraction of the individual construct. The generalization gradient is the abstracted dimension of similarity-dissimilarity which orders a group of elements, and which in the theory of personal constructs is called a construct. Next, we advance from consideration of the individual construct to the consideration of the construct system. It is with these inter-construct relations of the system, rather than the intra-construct relations discussed above, with which the present research is most
directly involved.

The elements for the formation of constructs with which we are primarily interested as psychologists are the significant persons in the individual's environment. These persons (hereafter referred to as figures) form the core from which constructs are developed, inasmuch as construing and predicting interpersonal behavior is the most fundamental aspect of human behavior in the psychology of personal constructs. For clinical and research purposes, it was necessary to develop an instrument which, through a sampling of figures in the individual's environment, would provide the necessary elements for formation of personal constructs. Such an instrument is the Role Concept Repertory Test (RCRT) (11). Essentially, it consists of a series of role titles for various representative figures in the individual's life. By considering these figures in combinations of three, it is possible for the individual to form constructs by contrasting two figures who are alike in some important way with the third figure who is different. In developing the RCRT for group administration, a grid or matrix form was used which permitted the individual to enter figures at the tops of columns, and constructs were entered and checked off along the rows. The matrix used in this study (cf. Appendix) illustrates such a grid. This provides a matrix
representation of the individual's construct system, the two primary properties of which are the constructs and the figures. The interdependence of these two properties of the construct system is evident. Construct dimensions are formed from the figures and are represented as rows in the matrix within which every figure either is construed as applicable or not applicable to each construct. Similarly, figure dimensions are formed from the constructs and are represented as columns in the matrix within which every construct is construed as either applicable or not applicable to each figure. This means that we have available a matrix which represents for a given individual a repertory of construct dimensions with which he perceives and predicts his world, and a repertory of figure dimensions which represent how each of the constructs is applied to the significant persons in his environment.

With such a method it is now possible to conceive of the matrix as a system of dimensions (construct and figure) which bear a relationship to one another in terms of their similarity of application. That is, for example, the constructs may be applied identically for one figure as for another, indicating that these two persons are construed identically. Thus, by measuring how similar any one
dimension, either figure or construct, is to another of its kind, it is possible to obtain measures of mutual similarity among all the dimensions of either type. If these similarity measures are scaled from most to least similar to the particular dimension used as a reference point, then a continuum is obtained which can be used as the basis for studying generalization within the system.

The type of generalization in which we are interested here is what could be called *generalization of change*. The basic question to be answered is: what is the effect of change in one part of the construct system on the rest of the system? That is, it is assumed as a basic postulate of the psychology of personal constructs that change or movement in the direction of greater predictive power is a fundamental characteristic of a person's construct system. The system is thus in a constant state of flux. In addition, it must be assumed that the parts of the system are intermeshed, and therefore once a change is effected in one part, some kind of readjustment occurs in other parts. This assumption appears tenable when it is considered that in essence any one part of the system is formed from several other parts of the system. Thus, a construct dimension is originally set up as a product of abstraction from three
figures in the system. It is to be expected that this interdependency of parts of the system will vary from individual to individual depending upon the kind of constructs he uses, and upon the relative uniqueness of the figures he construes.

Within the system, then, it is possible to set up continua of similarity for both construct and figure dimensions. These continue provide the basis for studying the generalization of change from one part of the system to another. Furthermore, these continua are scaled in terms of the similarity perceived by the subject of the elements (either constructs or figures) which compose the continua. Thus, the requirement of a psychological gradient scaled in terms of similarity as perceived by the subject is fulfilled.

Having established the order of the dimensions of similarity-dissimilarity as perceived by the subject for constructs and for figures, we are now in a position to set up hypotheses concerning generalization of change within each of the dimensions, that is, how change in one construct generalizes to other constructs, and how change in the perception of one figure generalizes to other figures. Inasmuch as these gradients are to be used to predict generalization of change in the system, it is necessary to consider next the theoretical and empirical facts as they relate to change, in the psychology of personal constructs.
Prediction and Change

The postulation in the psychology of personal constructs of directionality of change in the personal construct system towards more optimal anticipation of events, places emphasis upon the expectancy or predicting behavior of the individual. Constructs are invoked each time a prediction is made and the results of the prediction are experienced. The outcomes of the prediction can be one of three alternatives: evidence in support of the prediction, evidence counter to the prediction, or evidence which is equivocal as to outcome. For the present research, we shall be primarily interested in evidence in support of prediction (referred to as validation) and in evidence which refutes or runs counter to the prediction (referred to as invalidation). Thus, we have a circular chain of postulated events which can be diagrammed as follows:

\[ \text{CONSTRUING} \quad \overset{\text{CONSTRUING}}{\longrightarrow} \quad \text{OUTCOME} \quad \overset{\text{PREDICTION}}{\longrightarrow} \quad \text{PREDICTION} \]

The dotted arrow refers to the fact that outcomes of prediction are themselves construed, and affect the construction of further events which are to be predicted. If we recall the basic theoretical postulate, the individual is seeking optimal predictability. This means then, that having
construed an event, and predicted its outcome, two differing resultants can be expected depending upon whether the specific prediction was validated or invalidated. If the prediction is validated, then the individual is more likely to retain his construction which led to the prediction because of its proven predictability. If, however, the prediction is invalidated, then the individual is more likely to change his construction in the attempt to gain more optimal predictability.

Putting this in the form of simplified statements, we may say:

(1) Construction is a f (Prediction x Outcome)

If a construction is a function of both the process of prediction and of experienced outcomes (validation or invalidation), then we can break down the above into the following:

(2) Construction is a f (Prediction)

(3) Construction is a f (Outcome v or i)

Statement (2) indicates that the process of predicting may itself affect the construction, while statement (3) indicates that an outcome will affect the construction differentially depending upon whether it is validational or invalidational. In the present research, by holding the process of prediction constant (each subject acts as his own control),
it is possible to reduce statement (1) to statement (3), and thus induce change in construction through the experiencing of outcomes of prediction.

Research evidence is in support of the statement that invalidation is more likely to lead to change of construction than is validation. Poch (14) was able to demonstrate that invalidation produced significantly more construct changes than validation, the latter tending to lead to greater repetition of the construct in making a prediction over a period of time. The present study is designed to make use of validation and invalidation of predictions to affect change, and to predict not only the specific changes that follow, but also the generalization of these changes throughout the construct system as a whole.
CHAPTER III
THE RESEARCH DESIGN

Statement of the Problem

In the preceding chapters, we have presented a discussion of (1) the psychology of personal constructs, which provides the theoretical structure for the present study; (2) the place of change in the psychology of personal constructs, and (3) the relationship of the concept of generalization to personal construct theory. The integration of these three topics represents the framework for stating the essential problem of the present research.

To reiterate the fundamental postulate of our theoretical position is to state that a person's psychological processes evolve toward a more optimal anticipation of events. The means by which the individual strives to predict his world are his personal constructs. That which he construes is the interpersonal behavior of the significant persons (figures) in his society. Thus, the two basic interrelated aspects of the individual's psychological system with which the present study is concerned are the important figures in his world and the constructs with which these figures obtain meaning for the individual. It
has been pointed out that the formation of constructs from figures is a process analogous to that of generalization. Further, by representing an individual's constructs and figures as rows and columns respectively of a matrix, it is possible to obtain a gradient of similarity among figures and a gradient of similarity among constructs. These gradients can be ordered on a scale from most similar to least similar in reference to any construct or figure. This fulfills our requirement of psychological dimensions for studying generalization whose entire length is ordered in terms of the perceived similarity for the individual of its constituent elements. These gradients, formed from the matrix representation of the individual's construct system, provide the basis for predicting the generalization of changes within the system. This is the fundamental problem to be investigated.

The problem under study then is to obtain first a meaningful set of construct dimensions and figure dimensions for the individual. This is accomplished through the matrix method of construct system representation. The individual then makes specific predictions using these dimensions and receives validational and invalidational evidence as to the accuracy of his predictions. The effect of these outcomes of prediction will be such as to induce
change in those dimensions of the system about which predictions were centered. The effects of this change in the predictor dimension upon changes in other dimensions of the system will be hypothesized in terms of the gradients of similarity-dissimilarity which each subject sets up for himself with respect to either the figures or the constructs of his system. Thus, the problem entails predictions for generalization of changes along construct dimensions, and predictions for generalization of changes along figure dimensions. Following the logic underlying the general psychological concept of generalization, it is predicted that greatest generalization of a change in a part of the system (i.e., in either a construct or a figure dimension) will occur in those other parts of the system according to how similar they are perceived by the individual as being to the part undergoing change. Thus, in essence, the generalization concept is utilized in order to predict systematic avenues of change within the matrix of the individual's construct system.

**Experimental Hypotheses**

Because we are considering the generalization effects of two aspects of the system, there will be identical hypotheses for both construct and figure groups. The first set of hypotheses (I through IV) represent predictions of
generalized changes within the system of three kinds. Neutral hypotheses are presented in which generalization is predicted without recourse to the differential effects of validation and invalidation. Absolute hypotheses are presented in which generalization is predicted as a function of absolute similarity to validated and invalidated dimensions and of the differential effects of validation and invalidation on change. Relative hypotheses are stated in which generalization is predicted as a function of relative similarity to validated and invalidated dimensions and of the differential effects of validation and invalidation on change.

The second set of hypotheses (V through VIII) are predictions of the directionality of change in the system and are of three types. Validated dimension predictions are made with reference to the direction of the movement these dimensions take and the direction of the movement the system as a whole takes in reference to the validated dimension. Invalidated dimension predictions are presented with reference to the direction of movement invalidated dimensions take and with reference to the direction of movement of the system as a whole in relation to the invalidated dimensions. Generality of change hypotheses are made in which the comparative differences in movement toward
generality for validated and invalidated dimensions are predicted.

**Generalization of Change Hypotheses**

**Neutral Hypotheses**

I (1-A). When validational evidence produces a change in the construction of a figure, the changes produced in other figures of the matrix are directly proportional to the amount of change in and similarity to the validated figure.

I (1-B). When invalidational evidence produces change in the construction of a figure, the changes produced in other figures of the matrix are directly proportional to the amount of change in and similarity to the invalidated figure.

I (2-A). When validational evidence produces change in the application of a construct, the changes produced in the other constructs of the matrix are directly proportional to the amount of change in and similarity to the validated construct.

I (2-B). When invalidational evidence produces change in the application of a construct, the changes produced in the other constructs of the matrix are directly proportional to the amount of change in and similarity to the invalidated construct.

**Absolute Hypotheses**

II (1). When predictions regarding a figure are validated, the changes in the constructions of other figures in the matrix will be inversely proportional to the originally perceived similarity to the validated figure.

II (2). When predictions regarding a construct are validated, the changes in the perceptions of other constructs in the matrix will be inversely proportional to the originally perceived similarity of the validated construct.
III. (1). When predictions regarding a figure are invalidated, the changes in the constructions of other persons in the matrix will be directly proportional to the originally perceived similarity of the invalidated figure.

III (2). When predictions regarding a construct are invalidated, the changes in the perceptions of other constructs in the matrix will be directly proportional to the originally perceived similarity of the invalidated construct.

Relative Hypotheses

IV (1). When one figure of a matrix is validated and another figure is invalidated, the amount of change occurring in other figures of the matrix is directly proportional to their relative similarity to the invalidated figure in contrast to the validated figure.

IV (2). When one construct of a matrix is validated and another construct is invalidated, the amount of change occurring in other constructs of the matrix is directly proportional to their relative similarity to the invalidated construct in contrast to the validated construct.

Directionality of Change Hypotheses

Validated Dimension Hypotheses

V (1-A). The validated figure of a matrix tends to be a more general figure on the second matrix.

V (1-B). The validated construct of a matrix tends to become a more general construct on the second matrix.

V (2-A). The validated figure of the second matrix will explain more of the first matrix than will the validated figure in the first matrix.

V (2-B). The validated construct of the second matrix will explain more of the first matrix than will the validated construct of the first matrix.
V (3-A). The validated figure of the first matrix will explain more of the second matrix than it does of the first matrix.

V (3-B). The validated construct of the first matrix will explain more of the second matrix than it will of the first matrix.

Invalidated Dimension Hypotheses

VI (1-A). The invalidated figure of a matrix tends to become a less general figure on the second matrix.

VI (1-B). The invalidated construct of a matrix tends to become a less general construct on the second matrix.

VI (2-A). The invalidated figure of the second matrix will explain less of the first matrix than will the invalidated figure of the first matrix.

VI (2-B). The invalidated construct of the second matrix will explain less of the first matrix than will the invalidated construct of the first matrix.

VI (3-A). The invalidated figure of the first matrix will explain less of the second matrix than it does of the first matrix.

VI (3-B). The invalidated construct of the first matrix will explain less of the second matrix than it does of the first matrix.

Generality of Change Hypotheses

VII. Relative change in generality between the validated and invalidated figures will favor the validated figure.

VIII. Relative change in generality between validated and invalidated constructs will favor the validated construct.

Experimental Methodology

Introduction

Because change of construction, and its effects, forms
the basis of the present research, it was necessary to introduce invalidation of predictions as a central part of the experimental procedure. The changes in construction which occur are assumed to result from the invalidational procedure. Therefore, it was necessary to set up a control for this invalidation experience so as to obtain a more reliable estimate of its effects. The building into the design of a validational procedure was deemed an adequate control procedure. Because of the nature of the design, the need for a separate control group was eliminated, and in its place each subject served as his own control. Thus, each subject received validation and invalidation respectively of two separate predictions.

It should be recognized that validation and invalidation do not form separate experiences, but rather are most accurately construed as relative ends of the same experimental continuum. That is, validation is relatively more a success in prediction than is invalidation, and vice versa. Therefore, the question of exactly "how much" validation and invalidation each subject experienced may not be pertinent. Rather, for the present purposes, it is sufficient to assume that as a group the subjects received both a validation experience and an invalidation experience. If one is interested in the effects of these experiences, then
it is possible to operationally measure these for the subjects in terms of the amount of change in construction each produces.

Subjects

Several important considerations dictated the choice of subjects for the present research. Foremost, because making predictions about others' behavior is integral to the design, it was necessary that the subjects have some degree of familiarity with each other. This was necessary also because of the fact that each subject would be forming constructs based on other subjects who would be the objects of his predictions. In addition, it was necessary that the subjects, although familiar with each other, should not be so well acquainted that the possibility of change in construction should be excluded. Thus, a group was selected in which members had some familiarity with one another, but who were still in the early, formative stages of interpersonal acquaintance. Furthermore, the subjects needed to have some degree of homogeneity so that a member would have some reasonable expectations of what the behavior of other members would be in the situations he would be called upon to predict.

To meet these requirements, class sections of the undergraduate course in educational psychology at The Ohio
State University were selected. The majority of these students were education majors with a primary interest in teaching. The data for the research was collected during the first half of the spring quarter, 1953. An interval of about two weeks was allowed to elapse at the beginning of the quarter so as to permit mutual familiarity and acquaintance to develop among the subjects. Aiding this development was the fact that the class sessions were conducted in the form of small group projects, thus providing closer contact among the students than would be found in the ordinary lecture-type class.

On the other hand, the time interval during which the data was collected was kept as short as possible so that the familiarity variable could be kept as constant as conditions permitted. During the first two weeks of the quarter, the experimenter ran about 10 pilot research subjects for purposes of pre-testing the experimental materials and making slight but necessary revisions in the procedure.

A total of 80 subjects were used in the final research, with 40 of these subjects constituting the **figure group** and 40 constituting the **construct group**. Subjects were assigned alternately to each of the groups, thus insuring relative similarity to the two samples. Table 1 presents the basic data for comparing the composition of the two groups.
TABLE 1

Comparison of the Two Experimental Groups

<table>
<thead>
<tr>
<th></th>
<th>Mean Age</th>
<th>Mean Year in College</th>
<th>College of Education</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Male</td>
<td>Female</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construct Group</td>
<td>40 13 27</td>
<td>19.70 (3.29)*</td>
<td>1.42 (0.70)</td>
<td>33 7</td>
</tr>
<tr>
<td>Figure Group</td>
<td>40 12 28</td>
<td>19.80 (2.59)</td>
<td>1.57 (0.68)</td>
<td>34 6</td>
</tr>
</tbody>
</table>

* Standard Deviation

The close similarity between the groups is assumed to negate any chance that either sample fundamentally differs from the other in any respects important for the present study.

Instruments

(1) A "Situations Questionnaire" (Appendix) was constructed to be used as the predicting instrument for the subjects. This consisted of a series of four situations in each of three areas, yielding a total of 12 items. The types of situations were intended to be representative of plausible classroom situations, recreation situations, and job situations. Each item described a problem or choice.
situation followed by four alternatives, one of which the subject was to select. Care was taken in the construction of this instrument to insure that no one alternative would be considered the "right" or "proper" response by the subject. Thus, alternatives were constructed for each item so that any one of them could be reasonable for a given individual. An item analysis of the actual responses given by the subjects indicated that a fair degree of spread among chosen alternatives was achieved.

The choice of areas of behavior to be covered was dictated by what were felt to be common experiences for the group of subjects used in the research. This would insure that not only would a given subject have a background of experience in the situations described, but also he would have some expectancies of how his peers might react in these situations.

The length of the questionnaire was determined by considerations of time and interest. Inasmuch as the questionnaire was to be the behavior sample that each subject predicted for at least two other subjects, it was mandatory that its length be kept within reasonable limits.

Responses to the questionnaire were not intended to be used as data in the research. Rather, the questionnaire was constructed and administered solely to provide the
experimenter with a credible basis, in the eyes of the
subjects, for validating and invalidating predictions made
by the subjects.

(2) The basic instrument used was a modified version
of the Group Form of the Role Concept Repertory Test (RCRT).
This test (Appendix) was modified in several important
respects to fit the needs of this research. Because it was
felt that the standard form of the RCRT (11) was too lengthy
for the time considerations of this study, a shortened form
was constructed consisting of 12 role titles and 12 construct
sorts based upon the figures used in the role titles. This
provided a square matrix yielding equal numbers of construct
dimensions and figure dimensions. At the same time, it was
felt that the size of such a matrix was an effective solution
to the problem of getting a sufficient sampling of the sub­
jects' important constructs within a comparatively short
time.

An important revision of the group RCRT that was used
in this study had to do with the specific role titles em­
ployed. It will be recalled that each subject had to make
specific predictions about certain other subjects, and in
turn received validational evidence concerning these pre­
dictions. Because of this, it was considered that the subject
would find greater ease and utility in invoking constructs to make predictions which had been formed on the figures whose behavior the subject was attempting to predict. Accordingly, six of the 12 role titles were figures in the subject's own class whose behavior he was later to predict. In addition, the other five role titles (one of the titles was the self) were selected so as to be in the same general peer group as the subject and his classmates. Each time a subject formed a construct, the three figure elements consisted of one classmate figure and two outside-of-class figures. In this way not only was maximum use made of peers in forming constructs, but also most frequent use was made of figures whom the subjects knew more intimately so that the most meaningful constructs could be elicited.

(3) A "Predictions Test" was adapted from the "situations questionnaire" described above. This consisted, for the figure group, of the identical questionnaire filled out by the subject for himself in the group experimental procedure. Thus, each subject in the figure group predicted the behavior of two other classmates on the "Situations Questionnaire." For the subjects in the construct group, however, only four items (Appendix) were used from the "Situations Questionnaire" in making predictions. Two of
these items were in the area of classroom behavior and two in the area of recreation behavior. Because each subject in the construct group predicted the behavior of all six of his classmates, the actual number of predictions made by subjects in the figure group and subjects in the construct group were identical.

To aid the experimenter in "checking" the accuracy of each subject's predictions, answer sheets for the figure and construct groups (Appendix) were used. Each answer sheet contained the item number of the "Predictions Test" to be predicted, the figure for whom the prediction was being made, and the construct the subject was using in making his prediction. Not only did these answer sheets speed the administration and checking of the "Predictions Test", but more important they provided subject with condensed, visually simple results as to the "validity" of his predictions.

Outline of Experimental Procedure

The experimental design is divided into two major portions. The first part (1 and 2 below) has to do with the procedure administered in the group (i.e., class), while the second part (3 through 7) is concerned with the procedure administered individually.
Group Procedure:

(1). Administration of the "Situations Questionnaire" during a regular class hour.

(2). Administration of modified Group Form of the KORT during the same class hour, immediately after the Situations Questionnaire.

Individual Procedure:

(3). S fills in a duplicate matrix to be used later. Then S fills in the first matrix by checking every figure in each construct row to whom that construct applies most.

(4). Predictions are made by S using the "Predictions Test" and answer sheet with the explanation that the study is concerned with prediction of human behavior.

(a). Figure group Ss predict behavior of two classmates using all the constructs.

(b). Construct group Ss base their predictions upon two different constructs.

(5). While S fills out identification slip, Z "scores" S's predictions and returns one set of predictions "validated", the other set "invalidated."

(6). Using the duplicate matrix, S is instructed to fill in the checks once more "so as to do a better job of prediction next time."

(7). S re-predicts using same procedure as (4).

(8). Follow-up detailed explanation of research by Z to each class after all data is collected.

The Detailed Methodology

(1). So as to save time on the administration of the
group RCRT, (during the class session the day before the experimenter appeared,) the instructor of each class gave to each subject a list of the 12 role titles (Appendix) prepared by the experimenter with the instructions that these were to be filled in by each subject and brought to class the following day. Previously, each instructor had structured the research to his class as a required project which was part of the course.

The next day in class the experimenter gave each subject a "Situations Questionnaire", the front page of which contained a place for the subject's name and the following directions:

"Write your name and your instructor's name in the above spaces. The following situations involve three different areas of behavior. For each situation described (there are 12 altogether), draw a circle around the one answer a, b, c, or d which you feel would most likely be your behavior in that situation.

"There are no correct or best answers to select; merely circle the one choice you feel would mostly likely be your behavior in each situation. Work as quickly as you can."

Interest in this questionnaire appeared to be good among the subjects and 10 minutes are about the average time needed for its completion.

(2). After all subjects had completed the "Situations
Questionnaire", the experimenter gave each a directions sheet (Appendix) and a matrix form (Appendix) for the modified Group Form of the RCRT. After checking to make sure every subject had his list of 12 role titles filled out, the experimenter instructed the subjects to enter these 12 names in the corresponding slots provided across the top of the matrix form. Then the instructions, as given on the directions sheet, were gone over with the subjects. To facilitate understanding as to how the grid form was to be used to form constructs, with each class the experimenter gave one example on a matrix sketched on the blackboard. The illustrative contract which experimenter used (evil-saintly) was not used by any of the experimental subjects. It was necessary to emphasize that the constructs should be personal characteristics of the figures and not such characteristics as height, color of eyes, etc. In addition, experimenter emphasized that the opposite of a construct need not be applicable to the third person chosen as different from the two who were similar in some important way. The subjects, in general, were quick to follow the directions correctly. As they worked, experimenter circulated about the room, answering questions and helping those few who were having some difficulty. The majority of each class was able to complete the RCRT.
after a period of about 20 minutes to 30 minutes. As each subject finished, he brought his completed test to experimenter and made an appointment for his individual session with experimenter. In almost all cases the individual session took place within a week after the group session.

(3). At the beginning of the individual session, experimenter had each subject fill in a duplicate matrix form identically as he had filled it in in the group session. This was then put aside for further use. This procedure was helpful in recalling for each subject the constructs and figures he was to be using in his predictions. Also, minor inaccuracies in filling out the matrix could be corrected at this time.

Reference to the matrix form for the modified Group Form of the RCRT (Appendix) shows that in each of the 12 construct rows, three of the figure squares contain circles. It was these three figures under whom these circles appeared that the subject considered in forming each construct. This was done by placing check marks in the circles under the two figures who were construed as similar, while the third circle under the figure construed as being different was left blank. In filling out the duplicate matrix, these check
patterns for each construct row were copied exactly as on the
original matrix.

Next, subject was asked to construe all the other
figures on each construct dimension in addition to the three
figures on whom the construct was formed. The following
directions were given for this procedure:

"Here is the form you filled out in class the
other day. These constructs tell us in what differ-
ent ways you see people. Some of the constructs
may apply to some of these people more so than to
others. I want you to go across each construct row
here and check the other people, in addition to the
two you have already checked, whom you feel that
construct applies to most. If you feel the con-
struct applies least to a person, leave the square
under his name blank. You may check as many people
on each construct as you wish."

In this manner, a completed matrix was obtained for
each subject. It contained in addition to the figures and
constructs, a check pattern indicating how subject con-
strued every figure on every construct. The check pattern
in each column indicated how subject construed each figure
on every construct. The check pattern in each row indicated
how each construct was applied to every figure. Thus, by
comparing the similarities of these check patterns for all
the construct dimensions (rows) and for all the figure
dimensions along gradients of subject-perceived similarity-
dissimilarity for purposes of testing predictions of
generalization of change.

(4). Up to this juncture, all subjects have been through the same procedures. At this point, experimenter placed each subject into either the construct group or the figure group, in each case it being the alternate group from the one in which the preceding subject had been placed. A brief orientation was given to all subjects as to the suppose intent of the research as follows:

"This experiment has to do with how well you can predict the behavior of other people, in this case, the behavior of your classmates. We are interested in seeing how well college students like yourself can predict other students' behavior, and also how much they can improve their predictions."

(a). Subjects in the figure group were given their filled-in original matrix and asked to rank the six classmate figures in the order of how well subject felt he knew them. This procedure was found to be necessary in the pre-testing because of the differential effects of degree of familiarity upon subject's reaction to validation and invalidation. By ranking the figures according to degree of familiarity, it was possible to select the intermediate figures (ranks 3 and 4) as the two figures whose behavior was to be predicted. The intermediate rankings were selected because it was felt subject would have more
knowledge of these figures upon which to base his predictions than he would with lesser known classmates, while at the same time the plausibility of being invalidated in his predictions would be greater, as would the likelihood of change of construction, than the better-known classmates.

Following the ranking procedure, experimenter circled the two figures ranked 3 and 4, who were now to become the figures whose behavior subject would attempt to predict. In addition to his original filled-in matrix, subject had a blank "Situations Questionnaire" which for the figure group constituted the "Predictions Test" and an answer sheet on which to make his predictions. The instructions below were given to all subjects in the figure group:

"Now you are going to use these constructs to predict behavior in three areas: classroom behavior, recreation behavior, and behavior on the job. I want to see how well you can predict the answers these circled classmates gave to this questionnaire which you and they took in class. Write their names here on this answer sheet.

Each time you predict an answer, you should use one or more of these 12 constructs to base your prediction upon. You can look at this matrix here to see how you applied these constructs to each of these two people. There are 12 questions to predict and 12 constructs. Each time you predict an answer, draw a circle on your answer sheet around the answer a b c or d which you select and also write in, in the space provided, the number of the constructs (1 through
12) you used in making that prediction. Try to use as many of the constructs as possible so that when you are finished you will have used all or most of the 12 constructs.

When you have predicted all the answers for both people, I will compare how accurately you were able to use these constructs to predict what they actually did."

Space was provided on the answer sheets for subject to indicate which construct(s) he used on each prediction so that he would associate using the constructs to making the predictions. A few subjects had difficulty in doing this, but most subjects were able to use a majority of their constructs in making their predictions. A total of 24 predictions (12 on each figure) was made by members of the figure group.

(b). Subjects in the construct group were given their original completed matrix and were given the following instructions:

"Now you are going to use some of these constructs to predict responses of your classmates in classroom behavior and recreation behavior. I want you to select one construct which you feel is most applicable to a person's behavior in the classroom, and another construct which you feel is most applicable to a person's behavior in recreation situations. Put a "C" after the number of the construct you select for classroom behavior and an "R" after the one you select for recreation behavior."
It was considered that this procedure allowed subject maximum freedom to select meaningful construct dimensions with which to construe the behavior under consideration. The classroom and recreation behaviors were selected for prediction because it seemed likely that they represented greater areas of shared experience for subjects than did job to predict for all six classmates, it was necessary to limit the number of areas of behavior with which they would deal.

Each subject in the construct group was given, in addition to the original filled-in matrix, a "Predictions Test" which consisted of two representative items each from the classroom area and the recreation area of the "Situations Questionnaire". Subject was also provided with an answer sheet on which the names of his six classmates were listed under both the selected "recreation" construct and the selected "classroom" construct. The following directions for making predictions were given:

"Now I want to see how well you can predict the responses each of these six classmates gave to parts of the questionnaire which the class took. You are going to use only these two constructs to make these predictions and we'll see how well you do. You are to predict these six people's responses to the two classroom questions on the basis of your "C" construct here, and their responses to recreation questions on the basis of
this "R" construct. That is, on your answer sheet, fill in the names of the six people from this matrix who are in your class. Now, you are to predict all the people's responses to the recreation questions first using your "R" construct, and then all the people's classroom response next, using your "C" construct. For each person, circle the one response which you feel they most likely gave to the situation on the basis of this construct. You will want to consult this matrix sheet here in order to see how you applied each of these constructs to these six classmates.

When you have predicted the answers for all the people, I will compare how accurately you were able to use these constructs to predict what they actually did."

Each subject in the construct group predicted two items of behavior for six figures under two constructs, yielding a total of 24 predictions, the same as that for the figure group.

(5). When subject had completed his predictions, experimenter stated that he would now check the accuracy of the predictions. This was done by producing a large sheet of data paper on which every student in subject's class was listed along with their responses to the "Situations Questionnaire". Experimenter gave subject an identification slip to fill out, and then proceeded to "score" subject's predictions with red pencil, out of the line of sight of subject. For each subject in the figure group, one predicted figure was given relative validation and the other
invalidation. The validated and invalidated figures were alternated between ranked figures 3 and 4 so as to equalize the familiarity variable. Likewise, for the construct group, one construct was always validated, the other invalidated. The validated and invalidated constructs were alternated between the recreation and classroom constructs so as to avoid any systematic bias for a given kind of construct to receive a certain type of invalidation.

The "scoring" was accomplished by marking with red pencil a heavy line after each prediction that was "wrong". An arbitrary standard for the number of "right" and "wrong" predictions was used for the validated and invalidated figures and constructs. It was presumed that because of the lack of precise knowledge of the figures being predicted, and because of the nature of the predictor task, subjects would be most likely to assume a few errors in prediction would be made. Therefore, the figure or construct which received validation was scored with two "errors" of prediction, whereas the invalidated figure or construct received eight "errors" of prediction. Experimenter placed a large plus sign on the answer sheet next to the validated figure or construct, and a large minus sign next to the invalidated figure or construct as subject watched. Then, for the
figure group, experimenter made the following remarks:

"I have marked with a red pencil the wrong predictions you made for each of these two people. As you can see, you did a much better job of predicting this figure marked by a plus here, and a much worse job of predicting this figure marked with a minus."

The construct group was told:

"I have marked with a red pencil the wrong predictions you made with each of these constructs. As you can see, you did a much better job using this construct to predict, and a much worse job using this construct to predict."

Then, on both the original and the duplicate matrices experimenter placed plus and minus signs next to the validated and invalidated figures or constructs respectively.

Subjective reactions to this validational evidence were at times marked. Defensive reactions were most common, including the frequent statement that subject felt he knew the validated figure better (even though he had indicated otherwise in his ranking procedure). Several subjects became quite flustered and often it was necessary to reassure subject that these were people he was just beginning to know and subject couldn't be expected to understand them perfectly. For those subjects for whom experimenter deemed it necessary, more reassurance and opportunity for discussion was provided at the end of the experimental session.
In no case, in either experimental group, did a subject question the "scoring" procedure, and it was experimenter's impression that this part of the design was accepted by all subjects.

(6). Subject was next given his duplicate matrix which contained merely the checks in each construct row under the figures construed as being similar. This was the matrix which he was now to reconstrue following his experience of prediction. The figure group was told:

"Now we want you to be able to really improve your predictions for all of your classmates here. Remember that your predictions for this person marked by a plus here was much better, and your prediction for this person marked by a minus was much worse. Also, your predictions were based on how you applied these constructs to each of these people. So to improve your predictions, so you can do a better job of prediction next time, take this new matrix and re-check all these 12 people again as you now think these constructs may apply to them."

The construct group directions were:

"Now we want you to be able to really improve your predictions using all of your constructs here. Remember that your predictions with this construct marked with a plus was much better and your predictions with this construct marked minus was much worse. So to improve your predictions, take this new matrix and re-check all these constructs again as you now think they apply to each person so you can do a much better job of predicting next time."

Subject was directed to go across each construct row
and once again check the figures. Any changes in this fill-in procedure between the original matrix (M1) and the duplicate matrix (M2) provide the measure of the amount of re-construing assumed to have followed the validation and invalidation procedures. Thus, a change in construction of any construct row would be indicated by either a check in a cell of M2 where a void had been in M1, or a void in a cell in M2 where a check had been in M1. By this means, it was possible to obtain a score indicating the absolute number of changes from M1 to M2 in every figure dimension for each subject in the figure group, and a score of changes from M1 to M2 in every construct dimension for each subject in the construct group. Thus, we will have the basic change of construction scores not only for the validated and invalidated dimensions, but in addition any changes which have generalized to other construct or figure dimensions.

(7). Following the reconstruing of M2, subject was given a new answer sheet identical to the first one he had used, and was asked to predict once again to see if his predictions would improve. These re-prediction data were not used in the study, nor was this step essential, except that it served two purposes: Foremost, it served to fulfill the
subject's expectations (gained from experimenter) that this was a study concerned not only with prediction, but also with improvement of prediction. Secondly, it served as a safeguard among subjects lest they had discussed the individual session with a classmate who had been through the experience. In this way, the entire procedure would be plausible to the subjects, who having served in other psychological experiments, might otherwise suspect a hidden motive.

Experimenter "checked" each subject's second predictions so as to indicate some slight improvement, and discussed the subject's performance in this respect in comparison with other "college students".

(8). Later in the quarter, after all experimental data had been collected, experimenter went back to each class and discussed briefly the actual intent of the research, as well as the relationship of personal construct theory to education and teaching.
CHAPTER IV
RESEARCH RESULTS

Treatment of the Data

From the two construct matrices (M1 and M2) it was possible to obtain two sets of scores necessary for testing Experimental Hypotheses I through IV.

(1) Similarity Scores. For each subject, 12 scores were obtained which indicated the similarity in check pattern of every dimension in the matrix to the validated dimension. Likewise, 12 scores were obtained which indicated the similarity in check pattern of every dimension in the matrix to the invalidated dimension. These two series of scores represent absolute measures of similarity and thus were employed in testing the predictions of absolute change (Hypotheses II and III). By multiplying the series of absolute similarity scores, to the validated dimension by the change in the validated dimension, and by multiplying the series of absolute similarity scores to the invalidated dimension by the change in the invalidated dimension, weighted similarity scores for each subject were obtained with which to test Hypothesis I.

When each pair of absolute similarity scores is considered (i.e., one score for the validated dimension and one
for the invalidated dimension), the relative similarity score can be obtained by subtracting one from the other. This score indicates whether that particular dimension was construed as more similar to the validated dimension or as more similar to the invalidated dimension. This measure was used to test the predictions of relative change (Hypothesis IV).

(2) Change Scores. Change scores were obtained (cf. p. 59) on each dimension by considering the absolute number of differences in check patterns between M1 and M2 for each dimension. These change scores provided the measures of generalization when compared with the similarity scores described above. For the correlational procedures used, it was necessary to convert each set of 12 similarity and 12 change scores into one similarity and one change score. In this way it was possible to avoid confounding dependent and independent measures in the correlations. Such single scores were obtained simply by adding each subject’s individual scores of a type, and considering this sum as being the similarity or change score. This summing procedure has the obvious handicap of obscuring intra-individual measures of generalization which might be of value in individual cases of prediction. However, these scores provide satisfactory measures for inter-individual comparison, upon which the
major hypotheses of this research are based.

The Directionality Hypotheses (V through VIII) were tested by using each validated and invalidated dimension as a "scanning pattern" whereby its total absolute number of agreements with every other dimension was obtained on both Ml and M2. By testing the significance of the difference between the two totals thus obtained, direct tests of the directionality hypotheses were provided.

Validational Evidence and Change

Change in construction is postulated as being a resultant of experienced invalidational evidence. Thus, it is necessary first to consider the changes which actually occurred in the validated and invalidated figures and constructs since it is the generalization of these changes with which we are directly concerned. Table 2 presents the results of comparing the changes between actual validated and invalidated dimensions for both figure and construct groups.
TABLE 2

Comparison of Differences in Changes in Construction between Validated and Invalidated Dimensions for Figure and Construct Groups

<table>
<thead>
<tr>
<th></th>
<th>Mean Change</th>
<th>Mean Change</th>
<th>Mean St.'d</th>
<th>N</th>
<th>Dimensions</th>
<th>Dimensions</th>
<th>Difference</th>
<th>Error</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Invalidated</strong></td>
<td>3.40</td>
<td>1.47</td>
<td>1.93</td>
<td>40</td>
<td>Dimensions</td>
<td>Dimensions</td>
<td></td>
<td>0.38</td>
<td>5.08</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>Validated</strong></td>
<td>1.47</td>
<td>0.90</td>
<td>1.47</td>
<td>40</td>
<td>Dimensions</td>
<td>Dimensions</td>
<td></td>
<td>0.24</td>
<td>6.12</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

It is evident that for each group significantly greater change occurred in both invalidated dimensions as compared to the validated dimensions. This provides substantiation for the assumption that the generalized changes to be measured will stem from greatest change in the invalidated figure or construct.

From inspection of Table 2, it is seen that as a group, changes for the validated and invalidated dimensions of the figure group are greater than those for the corresponding dimensions in the construct group. Table 3 compares this difference.
### TABLE 3

Comparison of Between-Group Differences for Validated and Invalidated Dimensions

<table>
<thead>
<tr>
<th></th>
<th>Mean: Figure Group</th>
<th>Mean: Construct Group</th>
<th>Mean Difference</th>
<th>Standard Error</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Validated</td>
<td>1.47</td>
<td>0.90</td>
<td>0.57</td>
<td>0.31</td>
<td>1.88</td>
<td>.06</td>
</tr>
<tr>
<td>Dimension</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invalidated</td>
<td>3.40</td>
<td>2.37</td>
<td>1.03</td>
<td>0.41</td>
<td>2.50</td>
<td>.02</td>
</tr>
<tr>
<td>Dimension</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The fact that the figure group made significantly greater changes for both the validated and invalidated dimensions than did the construct group indicates that for the subjects of this study, it was more difficult to change the applications of constructs than it was to change one's perceptions of an individual. More specifically, in the present study it would appear to reflect the fact that the constructs subjects used were ones with which they had had relatively greater experience in prediction while the figures were persons of relatively recent predictive experience. Therefore, there would be greater likelihood that the constructs would prove relatively more resistant to change than would the figures.
When a test of significance is made between the two mean differences in change between validated and invalidated dimensions of both groups (Table 2), it is found that no significant difference exists \( (t = 1.00, p = .24) \); thus, there is not a reliable difference relative to mean difference scores between validated and invalidated dimensions when the two groups are compared. This insures the relative equality of the mean difference scores between validated and invalidated dimensions for both groups.

**Results for Generalization of Change Hypotheses**

**Neutral Hypotheses:**

I (1-A). When validational evidence produces change in the construction of a figure, the changes produced in other figures of the matrix are directly proportional to the amount of change in and similarity to the validated figure.

I (1-B). When invalidational evidence produces change in the construction of a figure, the changes produced in other figures of the matrix are directly proportional to the amount of change in and similarity to the invalidated figure.

I (2-A). When validational evidence produces change in the application of a construct, the changes produced in the other constructs of the matrix are directly proportional to the amount of change in and similarity to the validated construct.

I (2-B). When invalidational evidence produces change in the application of a construct, the changes produced in the other constructs of the matrix are directly proportional to the amount of change in and similarity to the invalidated construct.

For these hypotheses, a weighted score was used to
incorporate the change in the validated (or invalidated) dimension and the similarity of other dimensions to the validated (or invalidated) dimension. This weighted score was obtained by multiplying each absolute similarity score to the validated (invalidated) dimension for all the other dimensions by a constant which was the change in construction of the validated (invalidated) dimension. Using the Pearson product-moment correlation coefficient, the sum of these weighted scores for each subject became one of the two variables to be correlated. The second variable consisted of the sum of the change scores in all dimensions other than the validated and invalidated dimensions. Thus, to test the Neutral Hypotheses, each subject's summed weighted scores of absolute similarity were correlated with the summed change scores for all dimensions save those receiving validation and invalidation.

Table 4 presents the correlations obtained for the Neutral Hypotheses.
TABLE 4

Neutral Hypotheses Results

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Predicted Relationship</th>
<th>r</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (1-A)</td>
<td>positive</td>
<td>+0.40</td>
<td>.01</td>
</tr>
<tr>
<td>I (1-B)</td>
<td>positive</td>
<td>-0.02</td>
<td>-</td>
</tr>
<tr>
<td>I (2-A)</td>
<td>positive</td>
<td>+0.21</td>
<td>.07</td>
</tr>
<tr>
<td>I (2-B)</td>
<td>positive</td>
<td>-0.02</td>
<td>-</td>
</tr>
</tbody>
</table>

*df = 38; .01 level = 0.40, .05 level = 0.31

The Neutral Hypotheses were designed to test for generalization of the change produced in the dimensions along a gradient of absolute similarity to the changed dimension weighted by the actual change in that validated or invalidated dimension. Thus, those dimensions which had the greatest absolute similarity to the changed dimension were predicted to reflect generalized change most if the similarity score was weighted by the change in the validated or invalidated dimensions.

The results (Table 4) indicate a significant relationship for the validated dimension of the figure group (Hypothesis I (1-A)), and a relationship approaching
significance for the validated dimension of the construct group (Hypothesis I (2-A)). The results are negative for both groups when the invalidated dimensions are considered (Hypothesis I (1-B) and I (2-B)). These results suggest that generalized changes which occur to other dimensions can be predicted along the gradient of absolute similarity-dissimilarity if these absolute measures are weighted with the appropriate change in the validated dimension.

**Absolute Hypotheses:**

**II (1).** When predictions regarding a figure are validated, the changes in the constructions of other figures in the matrix will be inversely proportional to the originally perceived similarity to the validated figure.

**II (2).** When predictions regarding a construct are validated, the changes in the perceptions of other constructs in the matrix will be inversely proportional to the originally perceived similarity of the validated construct.

**III (1).** When predictions regarding a figure are invalidated, the changes in the constructions of other persons in the matrix will be directly proportional to the originally perceived similarity of the invalidated figure.

**III (2).** When predictions regarding a construct are invalidated, the changes in the perceptions of other constructs in the matrix will be directly proportional to the originally perceived similarity of the invalidated construct.

These hypotheses were tested by correlating, with the product-moment coefficient, the summed absolute similarity scores with the summed change scores for the validated and invalidated dimensions of each group. Table 5 presents these results.
### Table 5

#### Absolute Hypotheses Results

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Predicted Relationship</th>
<th>r</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>II (1)</td>
<td>negative</td>
<td>-0.03</td>
<td></td>
</tr>
<tr>
<td>II (2)</td>
<td>negative</td>
<td>+0.02</td>
<td></td>
</tr>
<tr>
<td>III (1)</td>
<td>positive</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>III (2)</td>
<td>positive</td>
<td>+0.05</td>
<td></td>
</tr>
</tbody>
</table>

*df = 38; .01 level = 0.40, .05 level = 0.31

The absolute hypotheses were designed to predict generalization of changes along gradients of absolute similarity to validated and invalidated dimensions. Further, these hypotheses assert that the generalization of change for validated dimensions will be negatively related to the absolute similarity of the other dimensions to the validated dimensions. Conversely, the generalization of change for invalidated dimensions will be positively related to the absolute similarity of the other dimensions to the invalidated dimension. These hypotheses follow from the prediction that greatest change in construction will follow invalidational, as opposed to validational, evidence.

The results presented in Table 5 offer no support for
any of the absolute hypotheses, indicating that absolute measures of similarity-dissimilarity, used as the gradient for predicting generalization of change, do not correlate significantly with the generalized changes which occurred.

**Relative Hypotheses:**

**IV (1).** When one figure of a matrix is validated and another figure is invalidated, the amount of change occurring in other figures of the matrix is directly proportional to their relative similarity to the invalidated figure in contrast to the validated figure.

**IV (2).** When one construct of a matrix is validated and another is invalidated, the amount of change occurring in other constructs of the matrix is directly proportional to their relative similarity to the invalidated construct in contrast to the validated construct.

These two hypotheses are designed to test the generalization of change along a gradient of **relative** similarity-dissimilarity to the validated and invalidated dimensions. As explained earlier, these relative similarity scores were obtained by subtracting the score of absolute similarity to the invalidated dimension from the score of the absolute similarity to the validated dimension for each of the dimensions in the matrix. This provides a continuum ranging from dimensions most similar to the validated dimension through dimensions most similar to the invalidated dimension. Thus, a "plus" relative similarity score for a dimension (referred to now as a "D-score") indicates that dimension is more similar to the validated dimension, while
a "negative" D-score indicates that a particular dimension is more similar to the invalidated dimension.

Therefore, the most general and direct test of the two relative hypotheses is offered by comparing the significance of the difference between the mean changes in those dimensions most like the invalidated dimension (i.e., those dimensions with negative D-scores) and the mean changes in those dimensions most like the validated dimension (i.e., those dimensions with positive D-scores). Because a directional difference is being predicted (greater generalization of change to those dimensions relatively more like the invalidated dimension), it is possible to consider the interpretation of the results with a one-tailed t-test of significance as well as with the more conventional two-tailed test. Table 6 presents these results.
TABLE 6

Comparison of Mean Differences of Generalization of Change to Dimensions Most Similar to Invalidated Dimensions, and to Dimensions Most Similar to Validated Dimensions.

<table>
<thead>
<tr>
<th>Mean of Mean Changes to:</th>
<th>Invalidated Related Dimensions</th>
<th>Validated Related Dimensions</th>
<th>Standard Error</th>
<th>M_D</th>
<th>M_D</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Figure Group</td>
<td>38†</td>
<td>1.27</td>
<td>0.93</td>
<td>0.34</td>
<td>0.17</td>
<td>2.00</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construct Group</td>
<td>39†</td>
<td>1.59</td>
<td>1.35</td>
<td>0.24</td>
<td>0.16</td>
<td>1.50</td>
<td>.13</td>
</tr>
</tbody>
</table>

* one-tailed p values

† two S's data not usable because all dimensions relatively more similar to validated dimension

† one S's data not usable because all dimensions relatively more similar to validated dimension

It will be noted that the above analysis is based upon the mean generalization of change for each subject to both the validated related and invalidated related dimensions. Thus, the tests of significance are between the mean differences of these mean generalization scores. It can be stated, then, that for the figure group there was significantly
greater generalization of change to those figures relatively more similar to the invalidated figure than to those figures relatively more similar to the validated figure. The results for the construct group are in the predicted direction and approach statistical significance. Thus, support for Hypothesis IV (1) at this general level exists, while the obtained results for Hypothesis IV (2) do not quite reach the desired level of statistical significance.

A further test of the hypotheses in terms of gradients of generalized change is found in correlating the summed D-scores of every dimension with the amount of change shown in every dimension. This yields a more exact estimate of the degree of association between degree of generalization of change and degree of relative similarity to the validated dimension. Table 7 presents the obtained product-moment correlation coefficients.

<table>
<thead>
<tr>
<th>Predicted Relationship</th>
<th>r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothesis IV (1)</td>
<td>-0.09</td>
<td>.34</td>
</tr>
<tr>
<td>Hypothesis IV (2)</td>
<td>-0.08</td>
<td>.35</td>
</tr>
</tbody>
</table>
The slight correlations obtained are in the predicted direction, but the low levels of relationship (Table 7) lack statistical significance. Thus, Hypothesis IV (1) is supported at the general level of greater mean generalization of change to figures relatively more similar to the invalidated figure, while a more exact measurement of this association in the form of a correlation fails to substantiate the hypothesis. Hypothesis IV (2) is supported at a low level of significance at the general level, but fails to be supported in terms of a significant correlation between D-score and generalization of change.

Further analysis of these hypotheses was made by converting the D-scores into arbitrary "standard-score" units. These results will be presented following presentation of the remainder of the experimental results.

Results for Directionality of Change Hypotheses

**Validated Dimensions Hypotheses:**

V (1-A). The validated figure of a matrix tends to become a more general figure on the second matrix.

V (1-B). The validated construct of a matrix tends to become a more general construct on the second matrix.

V (2-A). The validated figure of the second matrix will explain more of the first matrix than will the validated figure of the first matrix.

V (2-B). The validated construct of the second matrix will explain more of the first matrix than will the validated construct of the first matrix.
V (3-A). The validated figure of the first matrix will explain more of the second matrix than it does of the first matrix.

V (3-B). The validated construct of the first matrix will explain more of the second matrix than it will of the first matrix.

These hypotheses, and those relating to invalidated dimensions which follow are predicted upon the general theoretical postulate that the movement tendency of the individual's construct system is in the direction of more valid predictions and away from less valid predictions. Assuming each matrix to be a graphic representation of the construct system, by using each validated and invalidated dimension as a "scanning pattern", it is possible to measure the total number of agreements of the dimension's checks and voids with those of all the other dimensions.

This agreement score (generality score) indicates the generality of the dimension with reference to the matrix. By comparing the mean differences of the generality scores from one matrix to another, tests of the directionality hypotheses were provided. These results are given in Tables 8, 9, and 10.
### Table 3

**Results of Directionality of Change Hypotheses:**

**Validated Dimensions**

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Prediction</th>
<th>$M_D$</th>
<th>St'd. Error</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>V (1-A)</td>
<td>(V2-M2) $&gt;$ (V1-M1)</td>
<td>-0.20</td>
<td>1.51</td>
<td>0.13</td>
<td>-</td>
</tr>
<tr>
<td>V (1-B)</td>
<td>(V2-M2) $&gt;$ (V1-M1)</td>
<td>-0.32</td>
<td>1.02</td>
<td>0.31</td>
<td>-</td>
</tr>
<tr>
<td>V (2-A)</td>
<td>(V2-M1) $&gt;$ (V1-M1)</td>
<td>-0.62</td>
<td>1.01</td>
<td>0.61</td>
<td>-</td>
</tr>
<tr>
<td>V (2-B)</td>
<td>(V2-M1) $&gt;$ (V1-M1)</td>
<td>-1.50</td>
<td>0.83</td>
<td>1.81</td>
<td>.08 (.04*)</td>
</tr>
<tr>
<td>V (3-A)</td>
<td>(V1-M2) $&gt;$ (V1-M1)</td>
<td>-0.37</td>
<td>0.82</td>
<td>0.45</td>
<td>-</td>
</tr>
<tr>
<td>V (3-B)</td>
<td>(V1-M2) $&gt;$ (V1-M1)</td>
<td>-0.02</td>
<td>0.94</td>
<td>0.02</td>
<td>-</td>
</tr>
</tbody>
</table>

* one-tailed p value

Examples of the notation used in Tables 8, 9, and 10 are as follows: (V2-M2) is the generality score of the validated dimension of the second matrix for the second matrix. Similarly, (V2-M1) is the generality score of the validated dimension of the second matrix for the first matrix.

The results in Table 8 indicate no significant differences in generality scores for the validated dimensions except for Hypothesis (2-B). The results for this hypothesis tend toward significance in the opposite direction from that predicted when the one-tailed level of confidence is employed. That is, the validated construct of the first matrix...
tends to be a more general construct to its matrix than does the validated construct of the second matrix. Although the mean differences for the other hypotheses are consistently in the direction opposite from the hypothesized direction, there is no statistically reliable directionality of movement for validated dimensions save for the instance cited above. More striking evidence for directionality of change is found when the invalidated dimensions are considered.

Invalidated Dimensions Hypotheses:

**VI (1-A).** The invalidated figure of a matrix tends to become a less general figure on the second matrix.

**VI (1-B).** The invalidated construct of a matrix tends to become a less general construct on the second matrix.

**VI (2-A).** The invalidated figure of the second matrix will explain less of the first matrix than will the invalidated figure of the first matrix.

**VI (2-B).** The invalidated construct of the second matrix will explain less of the first matrix than will the invalidated construct of the first matrix.

**VI (3-A).** The invalidated figure of the first matrix will explain less of the second matrix than it does of the first matrix.

**VI (3-B).** The invalidated construct of the first matrix will explain less of the second matrix than it does of the first matrix.

The results for the above hypotheses are presented in Table 9.
TABLE 9

Results of Directionality of Change Hypotheses:

Invalidated Dimensions

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Prediction</th>
<th>MD</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>VI (1-A)</td>
<td>(I2-M2)&lt;(I1-M1)</td>
<td>+0.95</td>
<td>2.01</td>
<td>0.47</td>
<td>0.76</td>
</tr>
<tr>
<td>VI (1-B)</td>
<td>(I2-M2)&lt;(I1-M1)</td>
<td>+2.65</td>
<td>1.75</td>
<td>1.51</td>
<td>0.13 (.07*)</td>
</tr>
<tr>
<td>VI (2-A)</td>
<td>(I2-M1)&lt;(I1-M1)</td>
<td>+1.10</td>
<td>2.00</td>
<td>0.55</td>
<td>0.60</td>
</tr>
<tr>
<td>VI (2-B)</td>
<td>(I2-M1)&lt;(I1-M1)</td>
<td>+4.20</td>
<td>1.47</td>
<td>2.86</td>
<td>0.007 (.002*)</td>
</tr>
<tr>
<td>VI (3-A)</td>
<td>(I1-M2)&lt;(I1-M1)</td>
<td>+3.20</td>
<td>0.88</td>
<td>3.64</td>
<td>0.001 (&lt;.001*)</td>
</tr>
<tr>
<td>VI (3-B)</td>
<td>(I1-M2)&lt;(I1-M1)</td>
<td>+0.55</td>
<td>0.88</td>
<td>0.62</td>
<td>0.54</td>
</tr>
</tbody>
</table>

* one-tailed p value

From Table 9, the significance of the difference of the mean generality scores for the invalidated construct of the first matrix for that matrix, and for the invalidated construct of the second matrix for the second matrix, approaches statistical significance when the one-tailed level of significance is employed (Hypothesis VI (1-B)). Thus, the invalidated construct tends to be less general on the second matrix than on the first.

The positive results for Hypothesis VI (2-B) shown in Table 9 supports the prediction that the invalidated construct of the second matrix moves in the direction of less
generality with the first matrix when compared to the invalidated construct of the first matrix. Therefore, not only does the invalidated construct of the second matrix change in the direction of being less general relative to its own matrix (Hypothesis VI (1-B), but it also changes in the direction of being less general relative to the original matrix system (Hypothesis VI (2-B).

The positive findings for Hypothesis VI (3-A) represent the only statistically significant results for directionality of change for invalidated figure dimensions. The results for this hypothesis indicate clearly that the invalidated figure of the first matrix explains significantly less of the second matrix than it does of the first matrix. That is, the movement of the second construct system matrix following invalidation is in the direction of decreased generality with reference to the original invalidated figure.

The remaining hypotheses relative to the directionality of change for invalidated dimensions (VI (1-A), VI (2-A), and VI (3-B) are in the hypothesized direction but not significantly so.

**Generality of Change Hypotheses:**

**VII.** Relative change in generality between validated and invalidated figures will favor the validated figure.

**VIII.** Relative change in generality between validated and invalidated constructs will favor the validated construct.
These two hypotheses are intended to test for overall directionality of change in terms of validated dimensions becoming relatively more general to their matrices than do the invalidated dimensions. These hypotheses present at the most general level the theoretical idea that the construct system as a whole moves in the direction of greater predictability.

**TABLE 10**

Results of Directionality of Change Hypotheses:

Comparison of Relative Change in Generality of Validated and Invalidated Dimensions

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Prediction</th>
<th>St'd.Error</th>
<th>MD</th>
<th>M'D</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>VII</td>
<td>(V2-M2)-(V1-M1) &amp; (I2-M2)-(I1-M1)</td>
<td>+0.75</td>
<td>2.04</td>
<td>0.37</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>VIII</td>
<td>(V2-M2)-(V1-M1) &amp; (I2-M2)-(I1-M1)</td>
<td>+2.32</td>
<td>1.49</td>
<td>1.56</td>
<td>.12(.06*)</td>
<td></td>
</tr>
</tbody>
</table>

* one-tailed p value

Results for Hypothesis VII (Table 10) indicate a mean difference of change in generality in the direction predicted, but at an insignificant level of confidence. Thus, for the figure group, there is no reliable change in generality favoring the validated figure dimensions as compared to the invalidated figure dimensions. For the construct group,
however, the value of "t" obtained approached significance when the one-tailed test is used. For the construct group then, the validated constructs tend to become significantly more general from the first matrix to the second than do the invalidated constructs.

**Supplementary Results**

In order to gain a more clear picture of the nature of the generalization gradients obtained in this study, graphs will be presented to illustrate the nature of the generalization which occurred, and to elaborate additional points not covered by the preceding discussion of results.

It will be recalled that the dependent variable in which we are interested is the generalization of change along figure dimensions and along construct dimensions. These dimensions can then be scaled on a continuum of similarity-dissimilarity to the particular construct or figure dimension from which generalization of change is assumed to have occurred.

Two possible ways for scaling the continuum (which forms the abscissa of the coordinates for plotting the generalization gradients) have been discussed. These are (1) absolute similarity of the other dimensions of the matrix to the validated and invalidated dimensions and (2) relative similarity, in terms of D-scores, to the validated and
invalidated dimensions. A third method for plotting the similarity-dissimilarity continuum is in terms of a method of arbitrary standard scores derived from the D-scores.

This third method consists of dividing each subject's set of D-scores, ranging on a continuum from most positive (most similar to the validated dimension) to most negative (most similar to the invalidated dimension), into nine equal intervals, considering the zero-point of the D-score continuum to be a separate interval with the new "Z" scale value of five. These nine intervals are given scores of one through nine, with a "Z" D-score of one being those dimensions relatively most similar to the validated dimension, and a "Z" D-score of nine being those dimensions relatively most similar to the invalidated dimension. This arbitrary standardizing procedure permits the D-scores to be handled in a standardized fashion, although it should be emphasized that these are not true, mathematically derived standard scores. These three methods of obtaining similarity-dissimilarity scores will be used to plot the obtained generalization of change gradients. It is apparent that the shape the gradient takes is a function of the type of scalar units used for the similarity-dissimilarity continuum.
Graph 1

Generalization of Change Gradients for Figure and Construct Groups Using Absolute Similarity Scores to the Invalidated Dimension for the Similarity-Dissimilarity Continuum

*These similarity scores are mean scores for each successive grouping of original absolute scores ranging from 0 to 12. Point 2 above is the mid-point, point 4 being most similar to the invalidated dimension

Graph 1 presents the generalization of change gradients as plotted against absolute similarity scores to the invalidated dimension for both figure and construct groups. These scores are the same as those used to test Hypotheses III (1) and III (2) (p. 59). It should be noted that in Graph 1 mean generalized changes have been plotted against grouped similarity scores, and that in the correlational procedures
used to test Hypothesis III (1) and (2) the original change scores as well as the ungrouped absolute similarity scores were used. Thus, although it might appear that the predicted gradient was in general obtained for the construct group from Graph 1, there were sufficient fluctuations in the ungrouped data to render the results insignificant statistically.

Perhaps more meaningful is to consider the gradients formed by using the change scores plotted against relative similarity or D-scores. However, an underlying assumption in using D-scores in this manner, and for testing Hypotheses IV (1) and IV (2) should be made explicit. That is, it is assumed that a maximum D-score for one individual of +2, for example, will represent relatively less similarity to the validated dimension than will the maximum D-score of +8 for a different individual. That this assumption may not be entirely meaningful, led to the use of the "Z" D-score described previously. Granted the above assumption, we can plot the gradients obtained for Hypotheses IV (1) and IV (2) using D-scores which are grouped into five intervals for both groups. (There was a greater range of D-scores (+10 to -10) for the construct group than for the figure group, which had a range of D-scores from +8 to -8.)
Graph 2

Generalization of Change Gradients for Figure and Construct Groups Using D-scores for the Similarity-Dissimilarity Continuum

![Graph showing changes in mean values for C and F groups with D-scores.*]

* Point +2 represents dimensions most similar to validated dimensions, point -2 represents dimensions most similar to invalidated dimensions.

The gradients are plotted from scores used to test Hypotheses IV (1) and IV (2). It is evident that although portions of these gradients assume a general trend toward increase in mean change with increased similarity to the invalidated dimension, there is sufficient fluctuation to produce the insignificant correlations found for these hypotheses (p. 74). The extreme drop in Graph 2 of generalized mean change in the figure group from point -1 to...
point ... is an example of this, and represents an apparently consistent finding which shall be discussed later. Inspection of Graphs 1 and 2 indicate that the form taken by the generalization of change gradients obtained in this study are not linear and thus would likely not be reflected significantly in the correlations used to test the experimental hypotheses. By plotting the gradients along a continuum of similarity-dissimilarity based upon "Z" D-scores, we obtain a clearer idea of the form these gradients assume.

Graph 3

Generalization of Change Gradients for Figure and Construct Groups Using "Z" D-scores for the Similarity-Dissimilarity Continuum

* A "Z" D-score of 1 indicates greatest similarity to the validated figure, a "Z" D-score of 9 indicates greatest similarity to the invalidated dimension.
The scores plotted on Graph 3 could be used to test Hypotheses IV (1) and IV (2). As we have noted, these hypotheses were set up to test an expected linear generalization gradient, whereas the obtained gradients (Graph 3) appear to approach curvilinearity. Indeed, product-moment correlation coefficients obtained by correlating change scores and "Z" D-scores were insignificant statistically (correlations of -0.03 and +0.01 for the construct and figure groups respectively were obtained.) While the use of the test for curvilinearity with "eta" was considered, it was thought that an N of 40 represented too small a sample for reliable use of this statistic.

Two characteristics of apparent importance are to be found in the gradients of Graph 3. First, considering the gradient for the construct group, the curve appears to be somewhat bimodal in nature. That is, generalization of change has occurred more at the intermediate high and low "Z" D-scores rather than at either extreme or in the middle of the curve.

By combining both sides of this curve into a single gradient, it is possible to obtain converted "Z" D-scores (differentiating scores) which are in effect "standardized" D-scores with positive and negative signs disregarded. In effect, this is assigning a score to each construct which
represents the discrepancy between the similarity of the validated and invalidated dimensions to the construct without reference as to which of these two dimensions is most similar to the construct. Thus, a generalization gradient based on differentiating scores would indicate the degree of generalized change of a construct as a function of how much that construct differentiated the validated from the invalidated construct. This is equivalent to using each construct dimension as a scanning pattern for both the validated and invalidated dimensions and asking the question: How well does this construct differentiate these two dimensions? In this manner, a construct which was neutral as a differentiating construct would be one which was as similar to the invalidated construct as it was to the validated construct (zero D-score). On the other hand, a high differentiating construct is one which stands in close proximity to a validated construct which was quite dissimilar from the invalidated construct, or vice versa (i.e., either a high or a low D-score). Intermediate differentiating constructs would be those which were in close proximity to a validated or invalidated with an intermediate D-score value. Graph 4 represents the gradient for differentiating construct scores.
The differentiated scores were obtained by combining those "Z" D-scores with a certain deviation from the mid-point with those with the exact opposite deviation (e.g., "Z" D-scores of 7 were combined with those of 3). The gradient obtained from the differentiated scores for the construct group reveals an increase of generalized change as the differentiating score of the construct increases. The sharp increase in generalization at an intermediate point in the gradient suggests there may be an optimal point
of differentiation for a construct, at which point greatest generalization occurs and beyond which point decreased generalization occurs.

Reference to Graph 3 indicates that for both construct and figure groups, following an increase of generalized change (for both groups it is the highest mean point of change) intermediate between the midpoint and the end of the gradient, there follows a sharp decrease in generalized change as the extreme end of the gradient is approached. This suggests that greatest generalization was not taking place at the extreme end of the gradient where the dimensions were most similar to the invalidated dimensions, but rather at an intermediate point between the midpoint of the gradient and the extreme end. It will be observed that this is true for the construct group when "Z" D-scores are used (Graph 3), when D-scores are used (Graph 2) and when differentiating scores are used (Graph 4). Thus, for the construct group, this phenomenon of decreased generalization following greatest generalization of change at a point intermediate between the extreme point and the midpoint of the gradient is apparently a function of both how similar the construct dimension is to the invalidated construct ("Z" D-scores) but also a function of the size of the initial dissimilarity between the invalidated construct and the validated
construct (D-scores and differentiating scores).

These considerations suggest that the sharp decline in generalization at the end of the gradient is at a point where, for the subject the sharpest differentiations have been made. This being the case, the subject maintains his other most similar constructions (in the face of invalidation) and generalizes the primary change rather at a point further down the similarity continuum. This effect is doubly interesting because of its occurrence in the gradients for generalization of change for both figures and constructs. Further theoretical and practical implications of this finding will be discussed in the next section.

Discussion of Results

Essentially, this research has been concerned with producing a change in construction in the individual's construct system relative to either figures or constructs and predicting how this change will generalize to other constructs or figures of the system. By providing differential validation and invalidation for the use of constructs and figures in prediction, significantly greater change was obtained for invalidated dimensions. Two major kinds of hypotheses were tested: (1) hypotheses dealing with the generalization of the change and, (2) hypotheses dealing with the directionality of change.
The first type of hypotheses were tested for generalization of change from validated and invalidated dimensions (neutral hypotheses). It was found that there was a significant positive correlation between the extent of generalized changes in figure dimensions relative to the amount of change in and similarity to the validated construct. Correlations not significantly different from zero were obtained for the invalidated dimensions of both groups. These results suggest that knowledge of the effects of validation on a construct used in prediction can give a reliable indication of the amount of change occurring in other constructs of the system if the similarity of these other constructs to the validated construct is weighted by the amount of change in the validated construct. The same effects can be observed when validated figures are considered, but with less assurance as to the reliability of the results. Inasmuch as absolute scores of similarity-dissimilarity to the validated and invalidated dimensions were used in testing these hypotheses, the interpretation seems warranted that such absolute scores are only of value in predicting generalization of change in the construct system when they are appropriately weighted with the change in the validated dimension. At a general group level, for the neutral hypotheses we can say the changes produced in dimensions as a result of validation
and invalidation in other dimensions is positively related to the similarity of these dimensions to the validated dimension weighted by the change in the validated dimension. Thus, the results for the neutral hypotheses offer support for the idea that once change has been elicited through invalidation, when absolute similarity scores are used, greatest prediction of the generalization of this change to dimensions is obtained by considering the similarity to and change in the validated dimension.

The absolute hypotheses made explicit the assumption that the generalized change was primarily a function of invalidation of predictions. Therefore, a negative relationship was expected when changes were correlated with absolute similarity to the validated dimensions, and a positive relationship was expected when changes were correlated with absolute similarity to invalidated dimensions. The results for these hypotheses were consistently negative. Thus, the absolute similarity scores bear little or no consistent relationship with such generalized changes as occurred in this research. Although a general grouping of the data of the construct group for plotting mean generalized change against absolute similarity to invalidated dimensions yields a gradient assuming the rough form predicted, individual fluctuations are too great to render any more than a slight
positive relationship ($+$ 0.05).

Consideration of the results for the relative hypotheses helps us to see that the above criticisms of absolute scores are only partially behind the low correlations obtained. Specifically, it is seen (and was somewhat apparent in Graph 1) from inspection of Graph 2 that the gradients obtained, although in general obtaining to the predicted curve, are not by any means linear in shape, and thus tend to produce low correlations when the Pearson "r" is used. The results for the relative hypotheses tend to confirm this. The relative hypotheses state that the more similar the other dimensions of the matrix are to the invalidated dimension in contrast to the validated dimension, the greater will be the generalized change to these other dimensions. These hypotheses are similar to the absolute hypotheses in the assumption that greater generalized change stems from invalidation, but differ from them in comparing this change on a relative basis of similarity-dissimilarity to the validated and invalidated dimensions as opposed to an absolute comparison.

The most general test of these relative hypotheses, comparing mean generalized change to those dimensions most similar to validated dimensions and to those dimensions
most similar to invalidated dimensions, yielded significant positive results for the figure group and near-significant results for the construct group. Thus, when dimensions are grouped categorically as to being more similar either to validated or invalidated dimensions, significantly greater generalized change tends to occur in those dimensions most similar to the invalidated dimension.

A more specific test of the relative hypotheses in terms of a positive relationship of change to relative similarity to invalidated dimensions fails to yield significant correlations. However, by converting these relative D-scores into arbitrary standardized "Z" D-scores, and plotting the gradients accordingly (Graph 3), an important trend in the data is made evident. That is, the greatest generalization of change occurs at a point intermediate between the end of the gradient and the midpoint of the gradient, and that, contrary to the expectancy that greatest generalization would occur at the end of the gradient, there is a marked drop in mean generalization of change at this extreme point. Thus, it is evident that the obtained gradients for both D-scores and "Z" D-scores are not, by inspection, linear. Furthermore, the greatest cause for this seeming non-linearity is the decrease in generalization at the extreme end of the gradients.
That this effect may be a function of the differentiating power of the dimension, at least for the construct group, is suggested by several qualitative observations. Thus, when one half of the "Z" D-score construct gradient is reflected onto the other half, we obtain "differentiating" scores, inasmuch as they indicate how disparate the validated and invalidated dimensions are, when compared to this "differentiating" dimension, without reference to its greater proximity to either validated or invalidated dimensions. Those constructs with highest differentiating scores tend to have the greatest generalized change, with again greater generalization at an intermediate point than at an extreme end point of the gradient (Graph 4).

If subsequent research verifies this qualitative observation, then it would appear to be significant theoretically and practically. Theoretically, those constructs which have the greatest proximity to the invalidated constructs, are those for which the invalidation experience carries greatest indication for generalized change. However, to re-align these invalidated-related constructs would entail a reorganization of the construct system at a point where predictability has proven to be poorest. Thus, in order to preserve as much of the overall predictability of his system as possible, the individual moves down the
gradient to experiment with change among those constructs which have relatively more proven predictability than the extreme invalidated-related constructs. Clinically, this suggests that to change most effectively a patient's construction of people as "hostile", for example, would be to provide invalidation for the predictability of a construct related to (for example, "forward") but not identical with (for example "aggressive") the "Hostile" construct.

It should be noted that Dollard and Miller comment upon the greatest generalization "to stimuli that have an intermediate degree of similarity to the original one" in cases where "direct responses to the original stimulus object are inhibited by conflicting ones" (5, p. 173). These workers, using a Hullian orientation, attempt to plot the conditions under which this "intermediate" generalization will occur. Within yet another theoretical system, this "intermediate" generalization may be what Lashley and Wade refer to as generalization being the failure of discrimination (12).

The last set of hypotheses dealt with predicting directionality of change of validated and invalidated dimensions in terms of their generality within the matrix. In the present study there appears to be no consistent
directionality of change for validated dimensions. Theoretically, we should expect a change in the matrix toward greater generality of the validated dimension with its matrix. The significant finding that the validated construct of the first matrix tends to be more general than that of the second, runs counter to theoretical expectations. In the case of invalidated dimensions, there is evidence that the construct system matrix changes in the direction of having less generality relative to the invalidated dimension. Likewise, the invalidated construct tends to become less general relative to the first matrix. These findings would support the theoretical contention in personal construct theory that the directionality of movement in the individual is away from non-predictability, both in the sense of individual construct predictors, and in the more general sense of the system as a whole. However, in the matrix system used in this study, these findings are for construct dimensions only.

For figure dimensions, the case is more ambiguous. There is a highly significant change in the direction of the second matrix being less general than the first relative to the invalidated figure of the first matrix. Thus, while the changes in the matrix were away from the invalidated figure, they were not toward the validated figure.
The final directionality hypotheses tended to support the hypothesis that for the construct group the validated dimensions tend to become more general relative to their matrices than did the invalidated dimensions. No significant results were found in this regard for the figure group.

The greater number of positive findings for the construct group than for the figure group in the directionality hypotheses is consistent with the theoretical development of the psychology of personal constructs. The basic formulations out of which the directionality hypotheses stemmed were made with the systematic relations of constructs in mind. The addition of figure dimensions to fit these systematic formulations was primarily a function of the matrix method employed in this research.

Related to this is the observation that although construct dimensions which were validated and invalidated had significantly less change than the validated and invalidated figure dimensions respectively (Table 3), the figure dimensions tend to reflect less generalized change than to the construct dimensions (Table 6). This suggests that constructs are more systematically interrelated as dimensions of the system than are figures. This greater interrelation, which is partially formed by the shared commonality
of figure elements, might explain the greater resistance of construct dimensions to change than the less interrelated figure dimensions. However, once a change has been effected, then its effects in terms of generalization of change are likely to be reflected to a greater extent in the more interrelated construct dimensions.
CHAPTER V

SUMMARY AND CONCLUSIONS

Summary of the Research

The research reported here is an exploratory investigation of the problem of the systematic effects of change within the personal construct system. The basic hypotheses tested were derived from some fundamental postulates of the psychology of personal constructs, (11), the most crucial one being the statement that the individual's psychological processes evolve toward an optimal anticipation of events. The compatibility of the concept of generalization with the theory of personal constructs, and with conceptualization in particular, was elaborated and integrated into the research as an aid in formulating the hypotheses concerning generalization of change within the personal construct system. In order to obtain psychologically meaningful dimensions upon which generalized change could operate, the matrix method of construct system representation was employed. This method produces dimensions as avenues for generalization from two of the major interrelated parts of the construct system: (1) figures or persons in the individual's psychological society, and (2) constructs with which...
these figures become meaningful and predictable. The use of the matrix method permits these construct and figure dimensions to be ordered on a scale of similarity-dissimilarity, as perceived by the subject, in reference to the particular dimensions from which generalization of change was predicted. In order to produce the initial system-change from which other changes were assumed to generalize, a method of invalidation of predictions (controlled for each subject by validation of predictions) was incorporated as a vital part of the design. This invalidation was of two kinds: invalidation of predictions relative to the construction of figures, and invalidation of predictions relative to the application of constructs. In this manner, hypotheses were set up concerning the generalization of change along figure dimensions and along construct dimensions.

These hypotheses were of two major types: (1) hypotheses dealing with the generalization of change along both kinds of dimensions in relation to both absolute and relative measures of similarity-dissimilarity and (2) hypotheses concerning the directionality of change both to the system as a whole relative to validated and invalidated dimensions, and of these dimensions in relation to the entire system. Subjects used in the research were 80
undergraduate students in sections of a course in educational psychology at The Ohio State University. These subjects were divided randomly into two groups, one dealing with generalized changes of constructs, and the other with generalized changes in figures.

The results of the study indicate that except for predicting the generalization of changes as a function of similarity to validated dimensions weighted by the change in these validated dimensions, absolute scores of similarity-dissimilarity of construct and figure dimensions are likely to be of little value when considered independently. However, when the relative similarity-dissimilarity of construct and figure dimensions to validated and invalidated dimensions is considered, more consistent generalization of change is found. In general, there is greater generalization to those dimensions relatively more similar to the validated dimensions than to those relatively more similar to the invalidated dimensions. These results are tempered by the fact that this difference is not in the form of a linear relationship and that there is a sharp decline in generalized change as the extreme end of the gradient is approached. A consistent qualitative finding of the study was that the highest point of generalization for both groups occurred at a point intermediate between the
midpoint of the gradient and the end of the gradient. It is possible, for the construct group in particular, that this intermediate high-point is a function of the differentiating power of the construct in reference to the validated and invalidated dimensions. In any event, it appears that greatest generalization occurs to those dimensions which are somewhat removed from the dimension undergoing change.

The results of the hypotheses dealing with directionality of change indicate that the use of the validated dimension as a reference point for predicting movement within the system is relatively of little value in such a study as this. More consistent directionality of movement was found in relation to invalidated dimensions, particularly for the construct group. Here, there tends to be support for both the contention that the invalidated construct becomes less general relative to its matrix, and that the system as a whole becomes less general relative to the invalidated construct. For figure dimensions, changes in the matrix were away from the invalidated figure, but not necessarily in the direction toward the validated figure. The impression is gained from inspection of the directionality hypotheses results that construct dimensions function more systematically in reference to one another than do the figure dimensions.
Implications of the Research

It is felt that this study has demonstrated the usefulness of making more explicit the contributions to one another of a preceptually-oriented theory and the concept of generalization in predicting human behavior. At the same time, major reservations are to be noted in the conclusions drawn. Thus, the results of this study are to be construed at a general, group level only, and the nature of what to expect at the individual level must await further analysis and study of individual trends in perceptual generalization. Nevertheless, it appears that the general methodology used in this research is capable of producing meaningful results as a method of approaching the study of the dynamics of the individual's construct system.

The results imply that while general trends in generalization are to be observed, the extent of individual variation is striking. It seems evident that with the kind of cognitive behavior studied here, the form of the generalization gradient is not of a linear variety. In this regard, a further study, designed to test more specifically the reliability and nature of the intermediate high-point generalization obtained in this research would
be of both theoretical and clinical value. This extended study could attempt to collect data which permitted a more detailed statistical analysis of the form taken by this apparently curvilinear gradient, especially in reference to its apparent relationship to the discriminating power of the dimensions used to form the gradient.

The fact that relative similarity-dissimilarity scores yield more meaningful information about generalization, indicates that the clinician may need to be aware of the contrast effects of any invalidation he attempts to carry out on part of the client's construct system. It may be, if the results of this study are replicated and further elaborated, that the tighter interrelationship of construct dimensions as opposed to figure dimensions, as suggested by this research, implies that the therapist can do a more effective job of reorganizing the client's system by working more directly with constructs rather than with figures. On the other hand, if the client is faced more immediately with general loss of structure in his predictive system, possibly less diffuse and overwhelming threat will be provided by dealing most directly with figures.

These conjectures need to be further substantiated by studies at an individual level of construct system
generalization. This, it would be possible to determine characteristic types of generalization among individuals. It seems reasonable to assume, e.g., that the kind of constructs the individual employs (e.g., permeable vs. impermeable) will directly effect the nature of the generalization of change in his system. Although general, overall theoretical formulations to cover all individuals may be the ultimate goal of psychological theory, it may well be that at this stage of theoretical development we will need more restrictive, encapsulated laws dealing with kinds of behavior from which more general formulations can subsequently be developed.
BIBLIOGRAPHY


APPENDIX
Psychology 407

SITUATIONS QUESTIONNAIRE

Name_________________________  407 Instructor_________________________

Directions

Write your name and your instructor's name in the above spaces. The following situations involve three different areas of behavior. For each situation described (there are 12 altogether), draw a circle around the one answer a, b, c, or d which you feel would most likely be your behavior in that situation.

There are no correct or best answers to select; merely circle the one choice you feel would most likely be your behavior in each situation. Work as quickly as you can.
Recreation Behavior:

1. You find the following big events coming up the same day. If you had to decide to attend only one, which would it be?
   
   a. Dance band concert by a name band
   b. College basketball game
   c. Broadway play in town
   d. Nationally known visiting lecturer in your major field

2. You have a three-hour afternoon stop over in a large city before your next train leaves. Would you most likely?
   
   a. Wait in the station and read a magazine
   b. Visit the city's well-known art gallery
   c. Go to a movie
   d. Visit a friend who lives in this city

3. You and a friend have just found a seat in a theater as the movie starts, when you realize you can't see well past the large hat of woman in front of you. Would you most likely say to your friend?
   
   a. I should have chosen a better seat
   b. Some people. I'll tell her to take it off
   c. I always get behind a big hat
   d. (Say nothing)

4. Which of the following pastimes would you most enjoy?
   
   a. Swimming with a group of friends
   b. Watching a political debate on television
   c. Reading a novel
   d. Dancing

Classroom Behavior:

5. It is the day before an important exam for which you need to study. However, this is also the last day a movie is playing which you really wanted to see. Would you most likely?
   
   a. Forget about the movie and study
   b. Go to the movie and study before and after the show
   c. Forget about the exam and go to the movie
   d. Miss a class that day so you can study and see the movie

6. It is your day to report on an assignment which you haven't had time to study adequately. Would you probably?
   
   a. Try to report on it as best you can
   b. Explain frankly that you haven't done the assignment
   c. Explain why you haven't been able to prepare yourself
   d. Miss class that day
A class you are in is given the following alternatives for a required project on a special topic. Which would you select?

a. Read a book about the topic and present a book report orally before the class
b. Choose to be one of two persons in a debate before the class on the topic
c. Do some research in the library and hand in a written paper on the topic
d. Work with a group of students who will present a report as members of a panel discussion before combined class sections

You are working intently to finish a paper in the library when two people sit down across from you and distract you with their continual loud talking. Would you most likely

a. Move to another seat
b. Let them know how you feel by your facial expression
c. Try to finish up in spite of their talking
d. Ask them to stop talking

Behavior:

On the first day of a new job you notice some of the other employees leaving for a mid-morning coffee break. Would you:

a. Wait for someone to invite you along
b. Join the group
c. Ask your supervisor if you can go along
d. Make some excuse not to go even if you are asked

You are given some work to do which you see you will complete before your supervisor expected you to. Would you:

a. Try to make the job last as long as it was supposed to
b. Finish up as soon as possible and ask for something else to do
c. When you're finished, take a break
d. Even though finished, give the impression of still working

You are a teacher in a school. Another teacher approaches you and tells you some "gossip" critical of a third teacher who is a good friend of yours. You believe the gossip may not be true. Would you:

a. Listen to the gossip and say nothing
b. Defend your friend
c. Ask the teacher talking to you if she knows the gossip is true
d. Explain you don't believe in listening to gossip

As a new teacher in a high school, you have been asked to select a committee on which to serve. Which would you select?

a. Visual aids committee
b. Student government committee
c. Library committee
d. School athletics committee
Below you are to list the names of twelve people. Following the description given for each person, write in the space provided the name of the person who is described. Write only one name for each description. Also, be sure to use each name only once. If you find you could use the same person's name twice on the list, think of another person who is next most like the description given. Thus, you should have listed the names of twelve different persons.

Be sure to bring this list with you tomorrow to class.

1. Write your own first name in this first blank.

2. Write the first name of your brother nearest your age, or the person who has been most like a brother to you.

3. Write the first name of your husband (or wife) or your closest friend of the opposite sex.

4. The name of a 407 classmate who would make a good teacher.

5. A 407 classmate you would like to know better.

6. A 407 classmate you find hard to understand.

7. A classmate in 407 who is popular with others.

8. Classmate in 407 you hope you don't have to be closely associated with.

9. Classmate in 407 you feel sorry for or would like to help.

10. The most successful person about your age whom you know personally.

11. The person your own age with whom you feel most uncomfortable. (about your own age)

12. The person known to you personally who appears to meet the highest ethical standards.

Check to be sure you have not used anyone's name more than once. This list will be yours to keep and no one else in the class will see it. Be sure to bring this list to class tomorrow.
Directions for Class Project

1. Write your name in the upper right hand corner of the test blank.
2. Write the numbers on the right side of the test blank to show that you have completed the test blank.
3. Write the numbers on the right side of the test blank to show that you have completed the test blank.
4. Write the numbers on the right side of the test blank to show that you have completed the test blank.
5. Write the numbers on the right side of the test blank to show that you have completed the test blank.
6. Write the numbers on the right side of the test blank to show that you have completed the test blank.
7. Write the numbers on the right side of the test blank to show that you have completed the test blank.
8. Write the numbers on the right side of the test blank to show that you have completed the test blank.
any. If the game that day
F P. Have you been to the
anywhere and you have done the assignment
Do you want to report on to your belt you can
Andrea would you prefer a

4. A class you are in to give the following information for a related product on a

Discussion Situations

Q. (Essay Question)

Q. I always get bored, my
Q. Some people do I will hear to take it off
Q. I should have chosen a better book

would you count like this to your friends?

If you have read a three-hour story over the table or if you have your next three loves.

2. You and a friend have just found seats in the theater and read a conclusion.

At this point a friend who lives in the city.

Do you have a three-hour story over the table or if you have your next three loves.

At this point a friend who lives in the city.
### SITUATIONS QUESTIONNAIRE

**Answer Sheet**

#### Recreation Predictions

<table>
<thead>
<tr>
<th>Person</th>
<th>Construct Used to Predict 1</th>
<th>Construct Used to Predict 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>1. abcd</td>
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</tr>
<tr>
<td>#2</td>
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<td>#9</td>
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#### Classroom Predictions

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<tr>
<th>Person</th>
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<th>Construct Used to Predict 2</th>
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<tr>
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119
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<th>Answer</th>
<th>Construct Used</th>
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<tr>
<td></td>
<td>2. a b c d</td>
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<td>3. a b c d</td>
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<tr>
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<td>4. a b c d</td>
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<tr>
<td>Classroom</td>
<td>5. a b c d</td>
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</tr>
<tr>
<td></td>
<td>6. a b c d</td>
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<td>7. a b c d</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8. A B c d</td>
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<tr>
<td>Job</td>
<td>9. a b c d</td>
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<td>10. a b c d</td>
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<td></td>
<td>11. a b c d</td>
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<th>Person #8</th>
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<td>3. A b c d</td>
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<tr>
<td>Classroom</td>
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<tr>
<td>Job</td>
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<td>11. a b c d</td>
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</tr>
<tr>
<td></td>
<td>12. a b c d</td>
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</tbody>
</table>
I, James Bieri, was born in Washington, D. C., June 13, 1927. I received my secondary school education at Woodrow Wilson High School in Washington, D. C. Following a period of service in the United States Navy, I entered Antioch College where the degree Bachelor of Arts was conferred upon me in 1950. I entered the graduate training program in Clinical Psychology at The Ohio State University in 1950 as a V.A. Trainee. I received the degree Master of Arts at The Ohio State University in 1951. Since that time I have been a U.S.P.H. Scholar and have served an internship at the Columbus Receiving Hospital. During the Spring and Summer Quarters of 1953, my time as a University Scholar has been devoted wholly to the work on my dissertation toward completion of the requirements for the degree Doctor of Philosophy in Psychology. Since the beginning of the Autumn Quarter, 1953, I have been an assistant instructor in the Psychology Department of The Ohio State University.