ABSTRACT

THE TRAINING OF OPENNESS AND
ITS EFFECTS ON INQUIRY

By

Richard Malcolm Piper

Previous studies have shown that certain personality characteristics, for example, cognitive complexity and verbal fluency, predispose one to inquire in a particular way. The major purpose of the present study was to investigate the possibility of training people to behave in a manner consistent with those characteristics and to study the effects of such training on inquiry behavior. Subsidiary to this purpose was a desire to assess the manner in which seeking style and training interact to influence inquiry behavior.

Sixty female college students were selected to represent one of two seeking styles, dialectical or didactic. Subjects were then divided into three experimental groups; training in problem solving, training in openness, and training in concept learning. Following training, Ss were observed in a complex inquiry situation, the Teacher's In-Basket.

For this particular study the only comparison of interest was between the openness training group and the concept learning group. An openness posttest administered to both groups revealed no significant difference between them.

Further analysis suggested that openness training, though not effective overall, may have been effective for that subgroup called didactic seekers.

Turning to the effects of openness training on inquiry behavior, results showed that the only effect of openness training was to increase the time spent in inquiry and the number of pieces of material processed. This was interpreted to mean that openness training acts upon the commitment to inquire but has no effect at all upon inquiry skills *per se*.

Contrary to results of previous studies, there was no effect at all for seeking style. Data were examined in an attempt to account for this negative finding.

Another variable manipulated in the study was cueing. Half the subjects were cued within the inquiry session to use what they learned in training. The other half was not cued. There was no effect due to cueing.

The results have at least two implications for a theory of inquiry. One is that inquiry should be conceived of as consisting of two relatively independent components: (a) commitment to inquire and (b) inquiry proper. A second is that effective inquiry is dependent upon field-specific learning.

For education, the implications seem to be that it is possible to train people to make a commitment to inquiry. This commitment will not itself improve the effectiveness of inquiry but it does form one of the prerequisites.

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CHAPTER I

OVERVIEW

A young man is sitting at his desk working over an exam. As he works beads of sweat form on his forehead. He twists and turns a great deal, bites his pencil and frowns. The instructor notices these signs of examinee discomfort. He also notices that the young man is quite behind the other examinees in terms of the number of exam items responded to. The instructor makes note of this. Later, he discovers that our discomfitted young student has failed the exam. The instructor looks further into the case and discovers that the student in question has recently transferred in from Holland where he had established a quite acceptable level of academic performance. Given the apparent high ability of the student, the instructor judges that the young man's most recent performance is incongruent with what one might reasonably expect. He therefore begins to search for some explanation. To what might this poor performance be attributed? Could it be a language difficulty, unfamiliarity with the form of objective examinations, insufficient study, inadequate entry skills? All of these present themselves as possible reasons. The instructor determines to have a talk with the young man so that the cause of his acute anxiety and poor

performance may be identified and eliminated, thus permitting him to perform at a level more nearly congruent with his aptitude.

The picture of the instructor dealing with the problem of the examinee is a picture of a man inquiring. Inquiry is a ubiquitous human activity, an activity which begins with the recognition that some indeterminate situation is problematic and which moves in the direction of resolving that indeterminacy. Dewey (1938) defines inquiry thus: "Inquiry is the controlled or directed transformation of an indeterminate situation into one that is so determined in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole (p. 104)."

Using the picture of the anxious student and the puzzled instructor, it should be possible to illustrate what Dewey means. The indeterminate situation in this case is the able student, ridden with anxiety and floundering academically. The situation is indeterminate in Dewey's meaning precisely because it is impossible to predict its outcome. Will the student ultimately succeed or not? This ignorance of the consequences will remain until the interrelations among the constituent elements can be determined. Once these are determined we have the unified whole about which Dewey speaks. We can perhaps move the student toward success.

Inquiry proper does not begin with an indeterminate situation. Rather the indeterminate situation provides <u>the antecedent conditions</u>. It begins when a person recognizes

that the situation is in fact indeterminate. "To see that a situation requires inquiry is the initial step in inquiry (ibid., p. 107). Thus, in the case before us, inquiry began when the instructor noticed that one of his students was exhibiting symptoms of anxiety. In this moment the indeterminate situation had been converted into a problematic one.

Once inquiry gets under way with the recognition of a situation as problematic it is important that the problem be formulated in such a way as to make reference to a possible solution. The danger here is that the problem statement or formulation will prematurely seize on a false or inadequate solution, thus closing the inquiry to other more tenable solutions. One protects himself against this by taking time to assess the relevant facts in the situation, constantly reformulating the problem in terms of the demands made by new information. In ideal form these formulations state what will happen when certain operations are performed under certain conditions. In terms of the illustration above, once the instructor recognized the problem, he began searching for relevant facts so as to be able to formulate hypotheses which would suggest a possible solution. The student was from Europe. Perhaps he had not therefore sufficiently mastered English. This is a testable hypothesis and would lead to further observations. Presumably, if the instructor allowed the situation to stay "open" long enough to make and test sufficient hypotheses, he would transform the situation into a determinate one, that is, he would identify the variables

relevant to the student's poor performance and their interrelations, thus making it possible for him to solve the student's problem.

Using Dewey's theory of inquiry as a model, Shulman (1963) undertook a study of the determinants of inquiry. In this study he summarized Dewey's model in a four point outline. Four processes, for him, constituted the elements of inquiry. The four processes were (a) problem sensing, (b) problem formulation, (c) search and (d) resolution. This outline was conceived of as a general model for describing the manner in which the inquirer deals with the environment, a way of handling input which produces the greatest understanding of phenomena as well as the most useful social consequences. Not that he always goes about it exactly in this order. In reality the inquirer may start by sensing a problem, formulate the problem, sense another problem, return to gather information related to the first problem, stop short of actual resolution, return to reformulate a second problem and so on. As Shulman, Loupe, & Piper (1968) have observed, this process of inquiry looks much more like a computer routine with its many loops and digressions than like a four point outline followed in some invariant order.

If Dewey's four-process description is an adequate characterization of the way inquirers go about their inquiring, it might be relevant to ask whether or not there are underlying personality characteristics which determine one's effectiveness as an inquirer, that is, characteristics which

determine how sensitive one is to problematic situations, how widely one searches for relevant information, and how competent one is in the solutions he reaches. This was one of the questions asked by Shulman *et al.*, (1968). They began with an *a priori* model of the effective inquirer based on the work of Stern, Stein, & Bloom (1956); Witkin (1954); Schachtel (1959); and Lewin (1944). The model included these characteristics: high associational fluency, preference for the complex and the ambiguous, preference for discussions over lectures, high field independence, non-stereopathy, and high risk-taking. People above the median on all these measures were classified as *dialectical* seekers; those below the median on all the measures were classified as *didactic* seekers. Selecting on these variables, it was found that dialectical seekers spent more time in inquiry, processed more pieces of material, consulted more sources, sensed more problems, and proposed more competent solutions than did didactic seekers. It was concluded that certain underlying personality characteristics do serve as determinants of effective inquiry, that these characteristics predispose one to be a particular kind of inquirer.

Given that effective inquiry as defined in this study is a desirable way of dealing with indeterminate situations and given that effective inquiry is partially determined by definable cognitive characteristics, it would be useful to ascertain whether these underlying determinants can be developed or modified through training so as to produce more effective inquirers. The present study addresses itself to this question. If it

is possible to improve inquiry behavior through training, this would have important implications for education at all levels.

Purpose

The purpose of this study is to assess the modifiability through training of certain specific cognitive and personality characteristics which are presumed to underlie and predispose one to effective inquiry. The effects of the training are observed in a complex and ambiguous problem-solving situation which has been used repeatedly to study inquiry performance (Shulman, 1963; Shulman et al., 1968).

Hypotheses

Expected results can be stated briefly. A group trained in those characteristics presumed to facilitate inquiry will be superior to a control group on all measures of inquiry effectiveness. These specific measures will be enumerated and described in Chapter III of this dissertation. It is further anticipated that the group cued to use what it learned through training will be superior to the uncued group on all measures of inquiry. The group selected to conform most closely to the model developed in training (that of the dialectical or "open" seeker) will be superior on all measures of inquiry to the group selected to conform less closely to the model. Finally, it is expected that the group initially lower on the desired characteristics will benefit more from training than the group which was initially higher.

Theory

The theory underlying the present study posits relationships between certain personality constructs such as complexity and non-stereopathy and inquiry behavior. Inquiry behavior has already been defined by Shulman's adaptation of Dewey's theory of inquiry. It remains to describe the related personality constructs and to show how they are believed to affect inquiry.

Before doing that, however, it would be well to show some of the formal similarities among the constructs. First, each of them, rather than being described by a point, is described by a continuum. The theorist defines the polar extremes and then locates individuals within a population with respect to their positions on the continuum between the extremes. One danger in this kind of representation is that it may be used to develop dualistic categories within which the investigator classifies all subjects. This temptation will be resisted here. The intention is to locate people along the continua in a "more or less" relationship with regard to the extremes. The extremes themselves are regarded as stereotypes. Presumably individuals representing these extremes are rarely found except in Dante or the Gospels.

A second similarity among the constructs is that, while they are represented pictorially as though they were unidimensional, they are probably in fact multidimensionsl. As yet there is no known empirical evidence that this multidimensionality is in fact the case. Hopefully the dimensionality

of these variables will one day be an object of study.

Personality constructs. The first variable of interest is defined by Schachtel (1959). It is a variable represented by a continuum whose extremes are defined by the terms allocentrism and autocentrism. These terms describe two different ways of perceiving the world. The autocentric person is predisposed to perceive only those objects or aspects of objects which satisfy some basic need or deficiency. The allocentric person, on the other hand, goes beyond need-dominated perception. He perceives things as exisitng in their own right. He has a greater openness to the world in the sense that he sees more things and sees them in greater detail. The distinction which Schachtel draws between allocentric and autocentric perception is almost identical to that which Maslow (1962) draws between B-cognition and D-cognition.

In inquiry it is extremely important that a person be open to the full array of information bearing on the particular problem under inquiry. Initially information is sought in terms of which the problem is formulated. Then the problem-as-formulated sets the limits on the kind of information which can lead to a successful conclusion. Thus, a lack of openness to information can lead both to faulty formulation of the problem and also to inadequate search. Increased openness should facilitate inquiry through providing adequate amounts of information.

A second variable of interest was studied by Stern et al., (1956). This variable is given by a continuum whose extremes are defined by the terms non-stereopathy and stereopathy.

The definitions of these terms are given fully in Chapter II. For now it will be sufficient to indicate that they represent personality stereotypes built from the concepts and terminology of psychoanalysis. Using an ideological inventory designed to identify people who approximated these extremes, Stern et al., selected two samples of freshmen to study. Among the things which characterized the non-stereopaths in the samples was their seeming comfort in the relatively unstructured program in the College of the University of Chicago. The stereopaths on the other hand showed signs of discomfort, reflected in their much greater tendency to leave the school.

Inquiry in the natural setting is like study in the College of the University of Chicago in that it is initially unstructured and ambiguous. Whatever structure there is must be supplied by the inquirer. Inquiry does not even begin until the inquirer recognizes that he faces a situation that requires inquiry. After that he still must set the terms of his inquiry; how he will formulate the problem, how long and how far he will search for information bearing on the problem, and what for him will constitute a satisfactory solution. This encounter with the unknown and the unstructured is believed to be unsettling and uncomfortable for the person who prefers known ways of doing things, who wishes to have familiar labels for things, who likes to have other people structure tasks for him. Presumably, then, being non-stereopathic facilitates performance in inquiry.

Rokeach (1960, 1968) worked with a continuum whose

extremes are defined by the terms open-mindedness and closed-mindedness. He emphasized cognitive structures which vary in the degree to which they permit information to speak for itself. The closed-minded person is one who has an inflexible system of beliefs which requires all new information to be interpreted in terms consistent with the system. The open-minded person is characterized, on the other hand, by a flexible system of beliefs which takes information on its own terms and as a result gets updated constantly.

Successful inquiry almost certainly requires an open-minded inquirer. Dewey (1938) reminds us that inquiry is competent only "in the degree in which the operations involved in it actually do terminate in the establishment of an objectively unified existential situation (p. 105)." By definition then solutions which must satisfy a priori, non-objective presuppositions cannot be competent. Data must be allowed to speak for themselves.

Another variable of interest, seeking style, is described by Shulman (Shulman, 1963; Shulman et al., 1968). It is a continuum whose extremes are labeled with the terms dialectical seeker and didactic seeker. This variable is partially dependent on the variables defined above. It makes explicit use of the stereopathy-nonstereopathy typology of Stern, Stein, & Bloom. The variable goes beyond that, however, to include some other dimensions. The dialectical seeker is defined as high in word fluency, preferring the complex and the ambiguous, preferring discussions over lectures, highly field-independent,

high in risk-taking, and non-stereopathic. The didactic seeker is defined as being at the opposite side of the scale on each of these dimensions.

Seeking style is being used in the present study because in the studies by Shulman (1963) and Shulman et al., (1968) it was shown that this variable is highly related to success in inquiry. The rationale behind the use of each of the defining dimensions is given in the sources cited.

Four dualistic typologies representing four complex personality variables have now been presented. The four are combined in the present study to form the compound typology called openness-closedness. Openness is a composite of allocentric perceiving, non-stereopathy, open-mindedness, and dialectical seeking while closedness is a composite of their opposites. Since openness is a composite of some characteristics which are presumed to facilitate inquiry, the assumption is made that openness does the same. The earlier assumption, made in respect to the four component variables, that the extremes are not categories to which one assigns people but rather end points on a continuum all along which one finds people distributed, applies equally to the composite continuum of openness-closedness.

The open person. The composite picture of the open person derived from the above systems can now be given. It should be kept in mind throughout that the characterization is general and impressionistic rather than operational.

Here, as is often the case in such matters, it is

convenient for purposes of analysis to "divide" the person into his private self and his public self. We wish to discuss both the person as he related to himself as well as the person in his relation to the world of external objects. The picture given here is a composite of models offered by Schachtel, Stern et al., and Rokeach.

The open person's private world. First then, what is the open person like "inside"? One thing that each person has to do is to come to terms with, to develop some mode of response to, the biological impulses with which he is genetically endowed, such as sex, affiliation, hunger, etc. The open person's characteristic response is to accept his impulses as good and act on them. He allows them expression either directly or in sublimated form through, for example, poetry, painting, music. But he does not allow his impulses to predominate. Rather he keeps them in balance with the demands of reality and with the demands of his value system. It is in this sense that he is a balanced person.

The open person also has a strong sense of self, as being one distinct and separate from the rest of the environment. He engages in introspection and self-appraisal. His view of himself tends to be positive and accurate. He can see himself as others see him. He likes himself, sees himself as worthy, as adequate, as wanted, as being identified with others. Since he has nothing he wants to hide, he tends to be self-revealing, self-dramatizing. He allows others to see himself as he is.

The open person is more likely to be free of personality

pathology. He will suffer, as do all of us, from anxiety but his anxiety will tend to be more focussed. He can therefore more easily verbalize it, label it, and thus work towards its dissipation. His conflicts are likewise conscious and verbalized. He is less likely to need psychiatric counseling but if he needs it he will go get it rather than pretend that nothing is wrong.

He will occasionally fail in an undertaking but if he does he has the capacity to pick up and start over again. He is adept at overcoming personal weakness. His behavior is plastic and flexible. He can easily adapt to changed circumstances. He is capable of sustained effort for remote goals.

The open person has an entirely internalized value system. Thus he does not go around quoting authorities such as "mama says" or "my pastor says" but says rather "I believe".

So much for what we might call the open person's personality organization. Let us talk now about his cognitive belief system. Let us think of this system as that mass of data which makes up the person's view of the world. How is it organized? One principle of organization which applies here is "integration". More of the bits of data are integrated, that is, are related logically and harmonically with one another and with the higher order primitive organizing principles. These data are in communication with one another rather than being organized into noncommunicating compartments as, for instance, one compartment for science and another for

religion. This means that new information inputs are acted upon in terms of their own merits. They are free to affect the total cognitive organization and appropriate adjustments can thus be made. In short, the open person is highly adaptive.

We can also think of any person's cognitive system as containing some disbelief sub-systems, that is, some things he does not believe. For instance, if he believes the Republican political philosophy, he probably disbelieves the Democratic, the Socialistic, and other political philosophies. What characterizes the relation between the open person's belief and disbelief systems is the high degree of differentiation between belief and disbelief systems as well as within belief and disbelief systems. He knows quite clearly how what he believes differs from what he disbelieves. While he is committed to a particular belief system he is highly accepting of people who are committed to different systems.

The open person's external world. A second question with which we wanted to deal was the way the open person relates to the world of external objects. The most general statement we could make is that he is characterized by an intense interest in his environment, a turning toward the environment which is noteworthy for its totality and its affirmativeness.

Some people see things "out there" principally as objects of use, objects to gratify one's needs. Not so the open person. He is more interested in the object as a thing in itself. He notices the richness of the qualities of the

object. This kind of approach to the object, whether it be a person or some inanimate thing, is absolutely indispensable for painter and poet, among whom we are likely to encounter some of the world's more open people.

So much for the open person's relation to the environment in general. The relation to which we now turn is the relation between the open person and other persons. We find that he places great importance on interpersonal relationships. Since he operates from the base of a secure self he is able to and predominantly interested in carrying on transactions with other people. Given that he does value himself and since in general he feels free to express impulse and emotion, he expresses aggression freely against any who threaten his autonomy and independence. He knows what he feels and he says what he means. This applies largely to authority figures whom he sees realistically frequently as overprotective and over-possessive. He is likely to express ambivalence toward parents. Nevertheless, he generally maintains good contact and rapport with others. He is sensitive to and concerned with how things seem to others and he uses this as a basis for his own behavior. He sees other people generally as friendly, enhancing, and worthy, as possessing integrity and dignity, as dependable, as potentially fulfilling and enhancing of self. He identifies with the underdog. He has a capacity for dramatic, idealistic social action.

Finally, there seem to be a few characteristics of the

open person which do not fit neatly into the two point organization of this resume. One is the fact that he seems to get along comfortably with, and maybe even prefers, ambiguity. He doubts pat answers to complicated issues. He sees life as a process of becoming rather than as the achievement of a settled state with goals achieved.

He sees the world as a non-threatening place. He looks forward to the future as exciting and full of wonderful possibilities. He feels adequate to cope with life. He is less likely than the closed person to lose himself in the "one great true cause" in hopes of bolstering up a faltering ego. He seeks friendships with people with varying points of view. He relies on rational authority. He rejects so-called absolute authorities of all types including books, persons, and institutions. He resists "partyline" changes in belief. He relies on his own perception of the facts to tell him where truth lies.

A Look Ahead

The present chapter has introduced the purpose, the objectives, and the underlying theory of the present study. The literature underlying the theory is presented in Chapter II. In Chapter III, the design is described. Results are presented in Chapter IV and discussed in Chapter V. The conclusions are stated in Chapter VI.

CHAPTER II

REVIEW OF LITERATURE

Literature related to the present study logically falls into two categories: (a) studies which describe and explore theoretical personality systems and (b) studies which deal with attitude change. Studies of the first type provided the foundation for the model of openness used here. Studies of the second type provided the rationale for the training procedure. The training procedure itself is described in Chapter III.

Studies Underlying the Model of Openness

The studies in this area have been more exploratory than experimental. They have been carried out by people whose chief concern was with the external validation of theoretical models, not with the manipulation of variables through the use of classical experimental designs.

There are literally dozens of studies that could be cited that would be relevant for the model. Authors who might be cited include Rogers (1962), Combs (1962), and Maslow (1962). It was decided, however, to limit the review to the work of Stern *et al.*, (1956); Rokeach (1960); and Shulman *et al.*, (1968).

The studies selected for review have one thing in common; they all grew out of the same matrix, namely, the work of Frenkel-Brunswik and her group. Rokeach was trained by her. Stern et al., though not trained by her, were influenced by her work. Shulman was one generation removed from her but nevertheless influenced by her through the work of Stern, Stein, and Bloom. Because of these common origins there is a certain thread of continuity in the work.

Each of the studies reviewed has in common the fact that a personality dichotomy is postulated. These dichotomies are similar enough that it was felt reasonable to "distill their essence" in a single model for use in a training experience.

Stereopaths and non-stereopaths. Stern et al., (1956) started with the model of personality described in the first chapter. It was intended "to demonstrate that a synthetic model can be used effectively for prediction, is susceptible to quantitative and objective measurement, and constitutes an economical alternative to other assessment methodologies . . . (ibid, p. 118)."

Following the development of the model, Stern et al., set out to construct an instrument that would actually measure the parameters in the model. The result was an ideological inventory called the Inventory of Beliefs. This instrument is one of the principal instruments used in the present study.

The inventory was administered to two successive

entering freshman classes at the College of the University of Chicago. Students scoring plus or minus one or more standard deviations from the mean were selected for further study. The low group was called stereopathic. The high group was called non-stereopathic. After equating for intelligence, systematic differences between the groups were studied.

The groups differed on several dimensions. Of principal interest to the present study was the non-stereopathic student's greater tendency to remain in the College in spite of its highly unstructured organization. The stereopathic student was much more likely to leave the situation.

The open and closed mind. Rokeach has long been interested in the constructs called beliefs, attitudes, and values. His interest in this area led him first to construct a model describing the relations among belief and disbelief systems and second to construct an instrument which would allow him to empirically investigate his theoretical formulations. The theory and related experiments are given in two books (1960, 1968). The instrument he constructed and used was the Dogmatism Scale. This instrument was used in the present study. Its use is described in Chapter III.

The experiments Rokeach carried out were largely aimed at exploring differences between what he called "open" minds and "closed" minds. The open mind is characterized by the degree to which it permits information to speak for itself. The closed mind is characterized by

inflexibility, by the requirement that all information be interpreted in terms of already existing beliefs.

Rokeach interpreted his findings as being consistent with this formulation. Of interest to the present study is the open minded person's greater ability to break sets and come up with novel solutions to problems as well as his ability to solve problems more quickly than the closed minded person.

Dialectical and didactic seekers. Shulman (1963, 1965) was interested in investigating seeking style as a determinant of behavior. He posited two seeking styles, the dialectical style and the didactic style. The dialectical seeker was said to be characterized by non-stereopathy, high complexity, high word fluency, field independence, high risk-taking, and a preference for discussions over lectures. The didactic seeker was said to be the opposite of the dialectical seeker in all these characteristics. It was hypothesized that, due to their predisposing characteristics, the dialectical seekers would perform better than the didactic seekers in complex inquiry situations.

In order to test these assumptions Shulman created the Teacher's In-Basket, an instrument which is fully described in Chapter III. The value of the instrument is that it gives the individual subject the same kind of freedom that he has in everyday life. There are few constraints on his responses. He has to set the terms of his inquiry: what he will sense as problematic, how long he

will inquire, what will constitute a satisfactory resolution of each problem that he senses.

Shulman carried out two major studies of inquiry using the in-basket (Shulman, 1963; Shulman et al., 1968). In each of these studies a major focus was on seeking style as a determinant of inquiry. In each of them results demonstrated that dialectical seekers spend more time in inquiry, pay attention to more of the stumulus materials, consult more sources of information , engage in a higher level of cognitive shifting, sense more problems, and reach more competent solutions.

The study by Shulman et al., gave the initial impulse to the present study. Quite naturally there are a number of connections between that study and the present one. The major similarity involves making comparisons between dialectical and didactic inquiry styles.

This concludes the discussion of the literature pertaining to openness. The elements of the model have been presented, a model which focuses on common attitude characteristics for training. It remains to show how one creates the setting for changing attitudes.

Studies Related to Attitude Change

A debate of long duration centers around the problem of how to differentiate the concept attitude from the related concepts of opinion, belief, and value. This problem is of

central importance in a discussion of attitude change. If one proposes to change attitudes, he certainly ought to have some adequate notion of what it is that is being changed. Some authors seem to use the four concepts interchangeably. For purposes of the present study, Rokeach's (1968) definition will be used: "An attitude is a relatively enduring organization of beliefs around an object or situation predisposing one to respond in some preferential manner (p. 112)." Since he defines attitude in terms of beliefs, his definition for that concept will be adopted: "A belief is any simple proposition, conscious or unconscious, inferred from what a person says or does, capable of being preceded by the phrase, 'I believe that . . . ' (p. 113)."

Beyond the problem of concept definition, there is the problem of describing the relation between attitudes and behavior. If one is successful in changing a subject's attitude toward an object, will this likely have any implications for the subject's behavior toward that object? On the other hand if one is successful in changing a subject's behavior toward an object, will this have any implications for the subject's attitude toward that object? This is a problem on which some reflections by Bettelheim (1960) shed some light.

During World War II Bettelheim spent time as a prisoner of the Nazis both in Dachau and Buchenwald. There he had many opportunities to evaluate the relative effects of environment vs. man's "true" nature as relative determinants

of man's behavior. He says:

> Only dimly at first, but with ever greater clarity, did I also come to see that soon how a man acts can alter what he is. Those who stood up well in the camps became better men, those who acted badly soon became bad men; and this, or at least so it seemed, independent of their past life history and their former personality make-up, or at least those aspects of personality that seemed significant in psychoanalytic thinking (Bettelheim, 1960, pp. 16-17).

His conclusion was that, "psychoanalysis is by no means the best way to change personality. Being placed in a particular type of environment can produce much more radical changes, and in a much shorter time (ibid., p. 18)."

Thus Bettelheim seems to answer one of the above questions to the effect that, under certain conditions, by changing a person's behavior one also changes the person's personality. This implies a change in attitude. Some of the literature on attitude change seems to support this position.

The literature on attitude change is immense. Insko (1967) has performed a valuable service for novices in organizing it. He categorizes eleven major theoretical positions. Then, in the interest of parsimony, he reduces the eleven positions to two. He says, "Many of the theories are characterized by one or both of two emphases; the importance of reward, reinforcement, or need reduction and the importance of consistency (p. 347)."

The present study is one which is characterized by both emphases. Since this is true, examples of both approaches are used. Indications are given of the manner in which each

approach was used in the training procedure. The first example is drawn from the literature on verbal reinforcement.

Insko (1965) wished to determine the effect of verbal reinforcement of oral responses to subsequent responses on a questionnaire. Assistants of the experimenter phoned all the students in an introductory psychology course, communicating to them opinion statements regarding the creation of a local festival. Responses of agreement and disagreement were differentially reinforced with the word "good". One week later a questionnaire was administered to the subjects. This questionnaire contained one item designed to test attitudes toward the festival. Presumably the subjects were unaware of any connection between the phone calls and the administration of the questionnaire. Analysis of results showed a significant effect as a function of the verbal reinforcement.

This technique of verbal reinforcement was used in the training procedure in the present study. Comments which were consistent with the model of openness were reinforced with words like "good", nods of the head, and other signs of pleasure and agreement. Comments not consistent with the model were ignored.

An example of the literature characterized by an emphasis on consistency is a study by Janis and Mann (1965). The particular technique used was role-play. The attempt was made to experimentally create a feeling of discrepancy or inconsistency between a habit and the ill effects of the habit. The subjects were smokers. Subjec s played the role

of a patient. The "patient" first waited in the waiting room. After a short wait he was brought into the doctor's office and was informed that he had a severe case of lung cancer, that immediate surgery was needed. Finally he was informed that the surgery would probably be unsuccessful. The role-play was carried out expertly enough that there was a high degree of realism. Subsequent behavior of the subjects indicated that the experiment was successful in inducing fear of cancer and a reduction in number of cigarettes smoked.

These are two examples of the kind of research that has gone on in the past. They should be sufficient to indicate the two basic approaches to attitude change.

A Synthesis of Models for Training

The models that have been presented have at least two things in common. They posit dualistic typologies. People are divided into two classes. These classes are said to occur in relatively pure form only at the extremes of the hypothetical distribution.

Another thing that the models have in common is that they are all value laden. To be at the "high" end of any one of the continua is "better" than to be at the "low" end. If you are at the "high" end you are bound to be more integrated, or a better inquirer, or more alert to and appreciative of the world around you.

While the models have these things in common they also

differ in some ways. One of the chief differences is in vocabulary. In each case the groups isolated at the ends of the hypothetical continua are called by different names. One theorist speaks of stereopaths and non-stereopaths, another closed minds and open minds, yet another of autocentrism and allocentrism, a fourth of didactics and dialecticals.

The psychological orientations of the various theorists are also different. One theorist casts his model in Freudian terms, another in phenomenological terms, yet another in cognitive terms.

With these differences, it might be asked whether it is appropriate to combine the models in the typology of closedness and openness as is done in this study. The answer already given here is that it certainly is appropriate to do so. It is assumed that the differences are more apparent than real. If one looks at the crucial test, the test of behavior, he will see that among non-stereopaths, dialectical seekers, open mends, and allocentric persons, the expected and/or actual behavior patterns are similar to one another.

What is the message the research reviewed above has for us? It is that people with definable underlying cognitive and personality differences are differentially effective while functioning in ambiguous unstructured situations. Whether one focuses on persons trying to structure a new belief system in order to solve a Doodlebug problem, or freshmen trying to adapt to an unstructured college program,

or education majors working on an in-basket, one finds that open people are more likely to be successful.

It has already been mentioned that one of the aims of this study is to investigate the possibility of improving inquiry performance through training in openness. Thus it becomes relevant to ask to what extent openness is modifiable through training. This question leads to a statement of one of the most important assumptions underlying this study, that is, that the underlying characteristics which predispose one to behave in an open manner are developed largely as a function of learning. Though there may be some genetic component, this component is not known. If then these characteristics were learned in the first place, it stands to reason that they can be modified through further learning.

But, given the brief training period contemplated in this study, someone may ask, can these characteristics be modified sufficiently to change inquiry behavior? The literature on learning would seem to require an answer in the negative. Changes may occur but they would be expected to be of small magnitude.

What then is the logic of the training experience? How can it be expected to have any effect on inquiry behavior? The effectiveness of the training procedure rests on the assumption that if people are given a model such that the behavior characteristics are clearly defined, they can, when instructed to do so, behave in a manner consistent with the

model. It may be that the person behaves "out of character". If he does behave in a non-customary way, if he can simulate the behavior of the open person, then it is reasonable to expect that this behavior will lead to improved inquiry behavior. If it can be shown that a brief training experience can indeed facilitate inquiry behavior, this would have important implications for education.

In the next chapter the design of the study, including the training procedure, will be discussed in detail.

CHAPTER III

METHOD

Two questions of overriding interest emerged from the study by Shulman et al. One was the question treated in this study regarding the training of openness and its effects on inquiry. The other concerned the training of general problem solving skills so that inquiry performance is improved. This second question was dealt with in a study by Michael J. Loupe. These two studies were conducted cooperatively to permit both to make use of the same control group. The two experimenters aided one another in training to avoid experimenter bias in training. Mutual help was also given in observation to permit making criterion observations blind, thus controlling for observer bias. The full extent and kind of links between the two experiments will become more obvious as the design is presented.

Beyond the investigation of these two major training questions was an interest in exploring further the personality dichotomy labeled dialectical-didactic. In the earlier study by Shulman et al., this dichotomy had been a powerful predictor of inquiry behavior. Thus the two themes, training and seeking style were woven together so as to see how they mutually affect one another.

Subjects

If the entire focus of this study had been simply in studying the effects of openness training, subjects might have been selected from a population at random. However, because the further study of seeking style *per se* as well as the interaction of seeking style with training were additional areas of interest it was necessary to select subjects who were characterized as being either *dialectical* or *didactic*.

Sixty female students in the beginning undergraduate level course in Educational Psychology at Michigan State University were selected from approximately 160 females taking the screening battery. A *dialectical* subject was defined as a person scoring above the median on at least three of the four screening tests. Conversely the *didactic* subject was defined as one who scored below the median on at least three of the four tests. Since the interest was in the selection of extreme subjects, subjects with all four tests either above or below the median were chosen first, then subjects having a score on one test on the opposite side of the median were chosen. These subjects were selected on the basis of the proximity of their deviant score from the median. Thus the 30 most extreme in the *didactic* direction and the 30 most extreme in the dialectical direction were selected from the 160 subjects taking the selection tests.

In selecting the 30 most extreme subjects in each direction it was expected that there would be mostly "pure"

types in the sample, that is, mostly subjects whose patterns of scores fell either all above the median or all below the median. This expectation was far from fulfilled. By this measure only 11 "pure" dialectical subjects were included. Only three "pure" didactic subjects were included.

At the time of testing all subjects were informed that certain people would be contacted for further participation on the basis of their test scores. They were told further that those who agreed to participate would receive $1.50 per hour for approximately six hours of work over a seven day period and in addition they would learn some things relevant to teaching. Subjects were contacted by telephone and approximately 90% agreed to participate. Those declining did so because of very heavy work and class schedules and/or family responsibilities. All subjects were paid $1.50 per hour and a $2.00 bonus if they kept their appointments. They were also told that their work would be valuable only if they completed all phases of the study and thus they would be paid only if they completed all work. All those who began the experiment continued to completion.

Instrumentation

Selection battery. The selection battery was composed of four instruments: (a) a Word Association Test, (b) a Complexity Scale, (c) a Political Preference Scale, and(d) an Inventory of Beliefs. It may be remembered that Shulman

et al., used a selection battery composed of six tests including three of the above. There were two reasons for not using the same six tests in this study: (a) it was felt on the basis of the earlier study that a smaller battery would do an equally good job of identifying dialecticals and didactics and (b) there was not enough time alloted to the experimenters to administer all six tests. Since complexity, non-stereopathy, and verbal fluency were known to be highly correlated with general inquiry performance, it was decided to use the tests of these factors. Politics was added to the battery even though it had not been used as a selection instrument in the earlier study. It had been shown there that political liberalism is highly related to effective inquiry.

A brief explanation regarding the tests used in the selection battery may be useful. The Complexity Scale is a 30-item scale that purports to measure the individual's reactions to the ambiguous, unpredictable, and asymmetrical. In the study by Shulman et al., it correlated .50 with the Inventory of Beliefs and -.06 with CQT Total. These correlations give an estimate of the instrument's concurrent validity, showing it is quite closely related to another measure of personality while it is uncorrelated with a measure of academic aptitude.

The Word Association test is a measure of verbal flexibility, the ability to produce many meanings for given stimulus words. Estimates of concurrent validity are given

by correlations obtained in the study by Shulman et al.; .45 with CQT Total, .42 with Michigan State University Reading, and .36 with Inventory of Beliefs. The measure seems to share common variance with academic aptitude on one hand and a measure of personality on the other.

The political preference scale gives an individual measure of political conservatism-liberalism. The scale used in this study contains items which are similar to the items used by Shulman et al. In that study the correlation of politics with beliefs was .36, with complexity was .23, and with word associations was .39.

The Inventory of Beliefs measures stereopathy-nonstereopathy as discussed in Chapter II. In Shulman et al., the correlation of beliefs with dogmatism was -.42, and with CQT Total was .08. Stern et al., report a median reliability of .86 for the inventory. The negative correlation of beliefs with dogmatism is appropriate since low scores on The Dogmatism Scale indicate lesser degrees of dogmatism.

Criterion instruments. Three instruments were used as criterion measures. They were the Dogmatism Scale, Loupe's Problem Solving Test and the Teacher's In-Basket. Since the Dogmatism Scale and the Teacher's In-Basket were both described in Chapter II, it will only be necessary here to describe the Problem Solving Test.

It was Loupe's intent to develop a measure that would assess the degree to which training in problem solving was effective in developing specific problem solving skills:

(a) problem sensing, (b) problem formulation, (c) hypothesis forming and testing. He hypothesized that mastery of these skills would result both in a wider search for information and in more competent solutions. The test had to be such as to allow for greater or lesser search as well as more or less competent solutions. The Problem Solving Test was the result.

This test has an unusual format. It consists of a small booklet with about 30 pages. Instructions are printed on the front cover. The instructions lead the examinee to turn to an inner page where the problem situation is described. The situation turns around a jobless husband who has come to the attention of the unemployment bureau. The examinee plays the role of an employment counselor. He is charged with the job of deciding how the jobless man arrived at his unfortunate state and how his problem might be solved.

Once the problem situation is set, the examinee is directed to a page which lists possible sources of information bearing on the problem. These sources are all contained in the booklet. The examinee is then turned free to work on his own. He works until he feels he knows what the man's problem is. At that point he stops and writes his solution.

Two scores are generated: (a) problem solving bits is the number of information sources the examinee used and (b) problem solving competence is the degree to which the examinee reached a complete and integrated solution.

Experimental Design

The design of this study can hardly be discussed without taking into account a parallel study by Michael J. Loupe. In his study Loupe concentrated on training some of the problem-solving cognitive and behavioral skills related to inquiry. His study will be described briefly now in order to give an overview of the design. The openness treatment will be described in detail later in the chapter.

Both the experimental and theoretical literature in the area of problem solving relate skill in inquiry to a number of general types of behaviors. Loupe trained subjects in some of these general skills with the aim of improving their ability to function in the Teacher's In-Basket. The specific skills taught were: (a) problem sensitivity, the perception of discrepancy, imbalance, or disequilibrium within a specified situation; (b) problem definition or formulation, the careful specification of interrelationships among bits of information in the presenting problem and the specification of limits and conditions placed on the solution by the problem itself; (c) hypothesis construction, the reasoning out of a number of possible causes of the problematic situation and the specification of criteria for accepting or rejecting each hypothesis; (d) search and resolution, the inspection of information related to the hypotheses in question with the end of restoring cognitive equilibrium.

Training in these skills took place in small groups of six to eight persons. There were three one-hour training

sessions plus a one-hour posttest session. The posttests were Rokeach's Dogmatism Scale and Loupe's Problem Solving Test. The training was followed by administration of the Teacher's In-Basket.

The reader will note that training in problem solving and training in openness were identical in amount of time spent and in numbers of training sessions held. For both conditions the posttests were identical. The control condition was also identical to the two experimental conditions in amount of time spent and in numbers of training sessions held. The posttest battery for the control condition was slightly different in that, in addition to the Dogmatism Scale and Problem Solving Test, control Ss were given a test on concept learning as well as a rating form for rating programmed teaching. These tests were given so as to give something related to the training, thus masking the fact that this was a control condition.

Summarizing then, one factor in the design encompassed three training conditions: (a) training in problem-solving, (b) training in openness, and (c) training in concept learning. Twenty subjects were assigned to each training group.

A second factor was seeking style. As already explained, this factor is conceived of as a continuum on which the people at the two extremes can be characterized as dialectical or didactic. Subjects were chosen such that the sample included 30 dialectical seekers and 30 didactic seekers.

A third factor was cueing. This factor was included

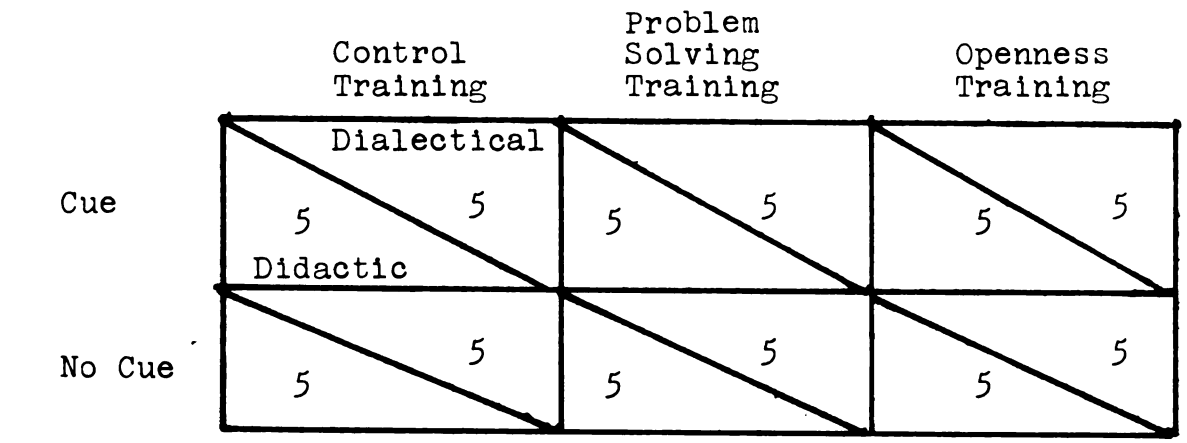
because it was felt that people, in spite of the fact that they have not had specific training in problem solving and/or openness, nevertheless have developed skill in problem solving and a conception of what it means to be open. Given that this is true, it should be possible for people who are cued specifically to use problem solving skills and an open style of behavior to perform more effectively than people who are not so cued. One underlying assumption is of course that some people will not use the appropriate skills nor the openness model unless they are cued to do so. Another involves the probability that, when the training period is brief, it is necessary to make explicit the connection between training and performance on the criterion task.

In the present study 30 subjects received the following cue in their in-basket instructions: "As you work on the in-basket, be as open as you can be and use the best problem solving techniques you know how to use." Thirty subjects were not cued.

Summarizing the entire design, treatment is one factor with three levels; cueing is a factor with two levels; seeking style is a third factor with two levels. This gives a 3 X 2 X 2 design with five replications per cell. The design is diagrammed in Table 1.

TABLE 1

DESIGN OF STUDY



Analysis

Data were analyzed by analysis of variance. Planned comparisons were made. The comparisons of greatest interest were: (a) problem solving treatment vs. control treatment, (b) openness treatment vs. control treatment, (c) cued treatment vs. non-cued treatment, and (d) dialecticals vs. didactics.

Openness Training Procedure

It has already been stated that the objective of the training was not to make basic changes in the personality or cognitive structure of the learner. It was rather to teach him the behavior characteristics of the open person so that

he could emulate the open person when asked to do so.

It was felt that the training procedure might more likely achieve its objective if there were someone in each training group who could play the role of the open person, modeling in her behavior the qualities that were being discussed. Such a person was found in the Department of Theater. Fortunately, it was not necessary for her to "play the role" of an open person since she was, by all the standards set up here, an open person. She formed a part of every openness training group, participating as any group member, feeding into the discussion whatever she felt to be appropriate. She had no set things to say or do. Naturally, other group members were not told of her special role in the experiment. The specific activities for openness training will now be described.

First day. Subjects were introduced to one another. Following these amenities the topic of openness was introduced by the group leader. The focus of this introduction was on the importance of teacher openness in facilitation learning. The group was given a written statement of the training objectives.

It was then stated that the group members probably did not know exactly what was meant by openness but that they probably knew something. The statement was as follows:

> You may be asking what is meant by openness. I am sure that you already know more about it than you think. Let us spend a few minutes seeing how much information about openness we can generate from our own experiences. We have almost certainly met someone in our lifetime whom we considered to be open or

> open-minded. Think back now about such a person that you have met... Ask yourself what there was about his behavior that caused you to think of him as open. What did he typically do? Say? How did he relate to other people? to himself? to things? As each of you shares his experience, the rest of us will note down the most important points that come out of the discussion. We will pool these notes later in a summary of the discussion.

Following his statement, contributions were elicited from each group member. After all had participated the important points were summarized on the chalk board. In this way the training was able to begin by building on what was already known.

The next stage consisted of giving the learners an explicit model of openness as it is developed in Chapter I. For this purpose a biographical sketch of a hypothetical open undergraduate named Paul was written. In writing it an effort was made to include the entire Stern, Stein & Bloom model, doing it in such a way as to maximize interest, readability and fidelity. A copy is included in Appendix C. It was introduced with the following words:

> Many people have thought deeply about what it means to be open. In a minute I am going to give you a selection by an undergraduate written about his roommate, Paul, a fellow he considered to be extremely open. As you read I would like you to underline those things about Paul which you think were particularly indicative of openness. Any new ideas you come up with we will add to our model. Here is the selection. Go ahead and read. Be sure to underline as you go.

Time was then permitted for reading. As soon as all were finished, discussion was opened again and each learner was requested to state something about what he had underlined. Contributions were added to the model already begun on the chalk board.

It was now time to summarize the model. A summary had been prepared in written form and was handed out at this time. The summary is found in Appendix C. Time was given for reading. When all had finished, the time and place for the next meeting was announced and the group was dismissed.

Second day. The meeting opened with the experimenter summarizing the work of the previous day. The written summary of the openness model was recalled in its broad emphases. Learners were asked if they found the model to be a satisfactory statement. Would they like to add or delete anything?

Following this review, the application phase began. Learners were told that they would be given cards which set up specific situations. Each situation was problematic in that it required that the person in question make some response. The response that ought to be made was not defined by the situation. Learners were asked to respond as they felt the open person would respond, that is, the open person as defined in the model developed during the first session. Following this explanation, the situation cards were passed out, one to each group member. Each card set up a different situation. A brief time was given to think about the situations. Then, one by one, group members were asked to state what they would do if they were in fact open. All statements were discussed and evaluated in terms of the model. Contributions made by the planted role player at this point were especially useful in shaping responses in the direction of the model.

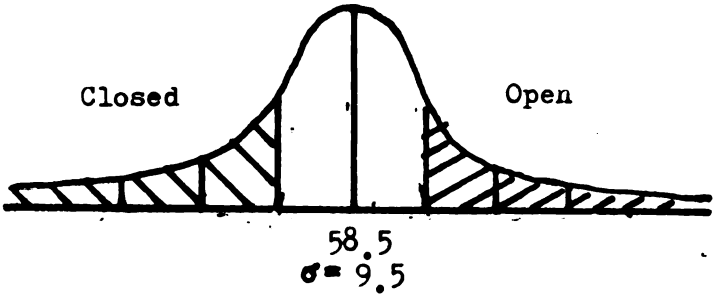
After each person had a chance to deal with his situation card, the Inventory of Beliefs was administered. The following set was given:

> I believe from our discussion that we have in fact gotten well acquainted with the model of openness. The solutions you have proposed to the situations show that you can apply the model. You can act openly if you decide to do so. Now comes the crucial test. How do you do in comparison with people who are uniformly judged to be open? In the first phase of this experiment you responded to the Inventory of Beliefs, an instrument which is intended to measure openness along the lines of the model we have developed. You were asked at that time to respond for yourself---to represent yourself as honestly as you could. I would like for you to respond to the inventory again. This time, however, answer the way you think an open person would answer. I will later compare your responses with the norms for open persons. See how close you can come to them. Make use of the model we have developed. Hopefully, you will be able to change your original score in the direction of openness. This will show that you have successfully comprehended the model. I will give you individual feedback in the next group session about how well you did. Individual scores will not be revealed or discussed openly in the session. If you wish an individual session to discuss your score, that can be arranged.

With this explanation, inventories and answer sheets were handed out. As soon as learners had finished they were excused to go.

Third day. Before the third session convened, the inventory responses for the second administration were scored. Responses for first administration and second administration were compared. Changes in the direction of openness and changes in the direction of closedness were recorded. A written summary of each individual's performance for first and second administrations was prepared.

With this work done all was ready for Session Three. The experimenter arrived at the meeting-place early and prepared a display of score information on the Inventory of Beliefs for 224 undergraduate students. This information was gathered during the selection phase of this study. The display was as follows:



With this information on the chalk board, the arrival of the group members was awaited.

On their arrival, the learners were given an interpretation of the display emphasizing that by definition open people are those who score one standard deviation or more above the mean. They were then told the means of their own small training group for administrations one and two. These two means were superimposed on the distribution for the 224 original students. The means for each of the three training groups for first and second administrations are given in Table 2.

This was considered sufficient background for the learners to receive and interpret feedback on their individual performances. The individual summaries which had been

prepared earlier were now handed out. Learners were permitted time to read them and make comparisons with the score distribution on the board.

TABLE 2

MEANS OF THREE OPENNESS TRAINING GROUPS FOR FIRST AND SECOND ADMINISTRATIONS OF THE INVENTORY OF BELIEFS (N=20)

	First Administration	Second Administration
	$\bar{X}$	$\bar{X}$
First group N=6	56.33	69.83
Second group N=7	61.71	69.43
Third group N=7	63.57	68.86

A brief history of the development of the Inventory of Beliefs was now presented. This presentation emphasized the empirical nature of the keying of the items. It also emphasized the behavioral differences between the open people and the closed people identified by the instrument. It was shown how people who score high on the inventory behave in a manner consistent with the model developed during the first session.

In order to make maximum use of the inventory certain items were selected for careful scrutiny in the group. The items selected were among those where half or less of the original 224 students agreed with the keying. Learners were

asked to try to hypothesize why the inventory authors keyed the items in this way. Why would the open person be expected to respond in one way when a majority of people respond in the other way? Once again opportunity was taken to apply the model.

Finally, in one last attempt to focus the model, printed statements from Stern et al., from Rogers and from Rokeach were handed out and read. These selections were considered to summarize important elements of the model in concise form.

The last thing to be done was to set up appointments for in-basket sessions and confirm arrangements for post testing.

Fourth day. This was the posttest session. It was given over to the administration of two instruments, Rokeach's Dogmatism Scale and Loupe's Problem Solving Test.

Teacher's In-Basket. The Teacher's In-Basket was administered to all subjects within a week of the posttest session.

Problem Solving Training Procedure

Problem solving training was identical to openness training in terms of numbers of sessions and total time spent. There were three training sessions, each designed to develop skill in problem sensing, problem formulation, hypothesis formation, and hypothesis testing. The training materials largely turned around detective-type plots.

A fourth session was given over to testing. The subjects were given Loupe's Problem Solving Test and Rokeach's Dogmatism

Scale. Within a week the Teacher's In-Basket was administered to them.

The interested reader should consult the dissertation by Michael J. Loupe (1969) for further details on the problem solving training procedure.

Control Training Procedure

The control curriculum consisted of a unit of work on concept learning taken from School Learning by Stephen L. Yelon (1969). This unit was developed using a systems approach. Instructional objectives were stated in operational terms. The materials were printed in program format. Steps between frames were small in size. There were activities built into the task. Learners had to pay attention in order to be able to do them. Feedback on responses came both from text materials and the instructor.

The materials were introduced to the group in the following way:

> You remember when we first told you about this experiment that our purpose was to study the relationship between cognitive style and various approaches to teacher education. In this particular group the approach we wish to use is what we call programmed teaching. The content of the program we will use deals with concept learning. Other groups in the experiment are studying the same topic using different approaches. At the end of the unit of work you will be given a test over the materials. We will be interested in using the results of this test to see which approach was more effective in helping people to master concept learning. In addition to the test you will be given a rating form which will give you an opportunity to tell how you liked this style of teaching. We will score these rating forms and then correlate them with scores on the pretests in order to see if there is any relation between cognitive style and liking for programmed teaching.

This explanation was, of course, a misrepresentation of the nature of the experiment. With one possible exception, there is no reason to believe that Ss in these groups suspected that they were in fact control subjects.

The content of the program included:

1. an introduction to concepts,
2. the processes of generalization and discrimination in concept learning,
3. concept learning as a special case of transfer of training,
4. suggestions on the teaching of concepts,
5. factors in concept learning.

The length of the program was identical to the length of the openness training program, three one-hour learning sessions and a one-hour posttest session.

Posttest. The fourth session was given over to the administration of tests. The test battery consisted of (a) a test on concept learning, (b) a form for rating liking for programmed teaching, (c) a problem solving test developed by Michael J. Loupe, and (d) Rokeach's Dogmatism Scale.

Teacher's In-Basket. The Teacher's In-Basket was administered to all subjects within a week of the posttest session.

The Teacher's In-Basket

The Teacher's In-Basket has already been described in some detail in Chapter II. Thus it will be necessary here only to outline some of its salient characteristics and the manner of its administration.

The in-basket consists of a number of different materials

such as are available to the average elementary school teacher in his classroom or in the school office. These materials include (a) report cards for each child in the class giving information on academic performance, deportment, age, height and weight; (b) cardexes for each child giving family information, achievement test scores, and intelligence testing information; (c) anecdotal records and discipline report slips for selected children written by former teachers; (d) current attendance book giving a record of absences and tardiness; (e) cumulative records giving attendance, achievement, intelligence, and family information for each child since his entrance into the system plus special information from nurses, therapists, psychometrists and others that had been gathered over time; (f) medical folders giving a health history for each child since his entrance into the system including a record of immunizations, operations, check-ups and their results, and other pertinent information.

The in-basket itself contains varied sources of information including a complete record of personality testing, a sociogram, memos from administrative personnel, letters from parents, a phone memo, a class schedule, a community description and map. Finally there is an intercom connecting the subject with the school office by which she could speak with the school secretary, the principal or reference memory. Reference memory is a device to give the subject access to information such as teacher's room scuttlebutt and such other information as the teacher would have if she had been around

the school for a few weeks.

This summarizes the in-basket materials. Let us turn now to its administration. The experimenter accompanies the subject to a small room in order to explain the experimental situation to her. The room contains a table and two chairs. The table serves as the teacher's desk. One chair is obviously for the subject; over the back of it a microphone is hanging. The other is the repository for the cumulative records and medical records. On the table is the intercom unit, the in-basket with its contents, plus a folder containing the report cards, the cardexes, the attendance book, the anecdotal records and discipline report slips. There is also a blank note pad and a pencil in case the subject wishes to make notes of anything. The walls are bare except for one where there is a large one-way viewing mirror behind which the observer sits.

When the subject and experimenter first enter the room, S is invited to sit at the desk and put a microphone on. She is informed that she is now in Room 103 of Ridge Forest School and that she is the teacher in this room. She is told that the success of the experiment depends on making her thoughts audible. She is to talk aloud about the things she is thinking. In order to help her get into the habit she is given some training in talking aloud. One by one, she is given three line drawings about which she is to create and tell aloud a story, one that has a beginning, a middle, and an ending. After she finishes she is told that this is exactly

what she is to do all the time, keep on talking aloud. She is then given written instructions for the in-basket performance. These she reads aloud. Next she is given a list of materials and resources available to her as she does her work. As she goes over the items on the list, a sample of each is shown to her for examination. She is then instructed in the use of the intercom for contacting reference memory. Here attention is now directed to the community description and map on top of the in-basket materials. She is invited to read them if she wishes. Finally, if she is cued, she is told just before the experimenter leaves the room, "There is just one last thing I would like to tell you. As you work on the in-basket, be as open as you can be and use the best problem solving techniques you know how to use. Remember to keep talking aloud all the time." If she is a non-cued subject she is told simply, "Remember to keep talking aloud all the time." With this the experimenter leaves the room and takes his place behind the one-way glass where he records on magnetic tape the things that S says and does.

This procedure is very analogous to the method used in the study by Shulman et al., (1968). The major differences are two in number. First, in the earlier study there were two observers, one engaged in writing a log of the subject's activities and the other handling several jobs: (a) serving as reference memory, secretary, and principal; (b) operating the printer-counter; (c) delivering cumulative folders and medical records when S requested them. In the present study

there was only one observer to do the job that had previously been done by two. Hence certain of the earlier procedures were changed. One major change came in the recording of S activities in the logs. Whereas previously the logs had been written out in longhand, they were now recorded on magnetic tape and later typed from the recording. This change had two beneficial results. First, since one can talk faster than he can write, enough time was saved to allow the observer to take over the jobs which had been done earlier by a second observer. Second, the recorded logs were more complete than the logs written out by hand.

One job that had previously been done by the second observer was dropped entirely. That was the job of delivering cumulative record folders and medical records to S on request. This would have resulted in the single observer failing to observe too many events. It was therefore decided to leave the cumulative records and the medical records in the room with S but to impose certain constraints on their use. These constraints were designed with the purpose of getting Ss to use these materials in a way analogous to the way they had been used in the first study. The instructions were: "The chair in front of you is the guidance office where permanent records are kept. If you come upon a problem which you would like to investigate in greater depth and you wish to consult the cumulative records or medical records you may leave your desk and go over to the guidance office to get what you want. You are restricted in your use of these materials in only one

sense; you may not get more than one cumulative folder and one medical report at a time."

This was the second major change in procedure. It was felt that this did not significantly change the manner and frequency with which the present Ss used these materials as compared with the way earlier Ss had used them. However, the presence or absence of differences in use was not explicitly studied.

Control for Bias

It was anticipated that bias could creep into the experiment in several ways (see Rosenthal, 1966). In one case there might be an experimenter bias in the training itself if E was the only one to conduct the training groups. Since the intent of the experiment was to evaluate the effect of training qua training, it was decided to have at least one other person share the responsibility of training the openness groups. Loupe trained two problem solving groups, one openness group, and one control group; E trained the rest.

Another possible source of bias was observer bias. It was feared that if the observer knew ahead of time the cognitive characteristics of the subject he was observing, or if he knew the training the subject had undergone, bias favoring the hypotheses would unintentionally creep into the observations. In order to avoid this, a third person not involved in the training kept the records on the subjects and made observer assignments such that the observer (a) was unaware

of the cognitive characteristics of the subjects he observed and (b) was not involved in their training.

One source of bias was deliberately built into the design, namely, selection bias. Subjects were selected to conform to a particular pattern of cognitive and personality characteristics as outlined earlier in this chapter. For this reason, generalizability of the results is restricted to populations like the one represented in the sample. Other known sources of bias are controlled for in the design itself.

Dependent Variables

It has already been mentioned that criterion measures were obtained through use of Rokeach's Dogmatism Scale and Shulman's Teacher's In-Basket. The Dogmatism Scale was used to assess the degree to which the variable "openness" had been manipulated within the training program itself. The Teacher's In-Basket was used to measure the effects of openness training as transferred to inquiry behavior. It is this latter relation which was of primary interest. It would therefore be appropriate to discuss its measurement in greater detail.

Inquiry as described by Dewey is a complex skill. It is made up of at least four distinct yet interlocking processes. Since it is complex, it could not reasonably be measured by any simple unitary measure. Complex criterion behaviors ought to be assessed using a variety of measures (Bracht and Glass, 1969). The value of the Teacher's In-Basket is that it yields

a number of measures of inquiry including bits processed, solution competence, mean competence, general inquiry, and others. The nature of these criterion measures will be discussed.

Problem sensitivity can be described as sensitivity to the discrepancies that occur in one's encounters with people, events and objects in one's environment. Discrepancies can occur between two external events or between an event and one's expectations for that event. In either case, violation of an expectancy is involved. An illustration may be useful here. Let us suppose that one is investigating the possibility of assigning some students to an enrichment program. At the moment we are concerned with, say, David Barrow. We are looking at a current record card and we note that David's IQ is 104. His achievement is just at grade level. The recorded IQ and achievement are congruent as far as our expectations go. Now we consult his cumulative record and find that here David's recorded IQ for the same test on the same date is 140. Consistent with the record card, achievement is average. This state of affairs involves two kinds of discrepancy, a discrepancy between two external events and a discrepancy between an external event and an expectation. As an example of the former case we have differing scores for the same event recorded in two different information sources. This violates the expectancy that one will find equality among all recorded values of an objective event. As an example of the latter case, we have a discrepancy between expected achievement

(superior) and actual achievement (average). This violates the expectancy that someone with a superior IQ will demonstrate superior achievement.

It would be useful for purposes of analysis to distinguish between a potential problem and a sensed problem. A potential problem exists wherever an event violates well-known, consensually-shared expectations. A sensed problem occurs when a potential problem is sensed as being problematic, that is, when a person actually becomes aware of a discrepancy.

The Teacher's In-Basket makes use of this distinction. The authors of the instrument have built in more than 300 potentially problematic events. When an experimental subject comes across one of these events and recognizes it as involving some discrepancy, he is given credit for having sensed a problem. His problem sensitivity score is the total number of potential problems he recognizes as being problematic.

Another score generated from in-basket performance is called information sources. This is the number of sources consulted in the solution of specified problems. The study by Shulman et al., demonstrated that people vary in the degree to which they consult a variety of sources before proposing a solution. At one extreme are people who take the barest amount of information and jump to a conclusion. At the other extreme are those who consult many sources of information before giving a solution. Using the example of David Barrow, the former approach might be demonstrated by the person who hypothesizes, without further search, that since average

achievement and an IQ of 104 are congruent, the IQ of 140 given in the cumulative record is just a transposition error. Therefore David should not receive enrichment.

An example of the latter approach would be the person who, in addition to the above hypothesis, makes an additional one, namely that the IQ of 140 might be correct and that David is a very dramatic case of underachievement. Since the discrepancy between these two alternative hypotheses cannot be resolved using only the given materials, this person looks in other sources for evidence bearing on both hypotheses.

An assumption made in this study is that the effective inquirer juxtaposes many sources of information in an effort to resolve sensed problems. The information sources score gives an approximation of this behavior.

It was observed in the earlier study that some subjects were extremely thorough in investigating some problem areas while they completely ignored others. Their use of sources was extremely effective for the limited number of problems they attempted. The total sources score did not indicate their full effectiveness since it was generated over all possible problem areas. To compensate for this the mean sources score was developed. This is the mean number of sources consulted within those problems actually dealt with.

Time is also a variable in the Teacher's In-Basket. It is assumed that people differ in their willingness to remain in situations which involve ambiguity and lack of definition. This assumption follows rather naturally from the theorizing

of Schachtel. The in-basket presents the subject with exactly this kind of situation. He is placed in a role-play situation and asked to do whatever he would do if this were a real situation and he were in fact the teacher. Those who have administered in-baskets can testify to the tenacity with which some subjects attempt to wring from the experimenter some more specific definition of the task.

In addition to this initial lack of definition of task behavior, the materials themselves involve ambiguity. There are many embedded potential problems which cannot be solved definitively with the materials given. This causes distress for those who seek quick closure and determinative answers.

These characteristics of the in-basket are included intentionally so as to measure the subject's degree of willingness to stay in the situation despite its ambiguity. Time spent is used as an approximate measure of this willingness.

Another measure of inquiry competence is bits. Theoretically the more effective inquirer will be more active in his search for information. This higher level activity will be reflected in the sheer number of pieces of material that he looks at and to which he actively responds. The information sources score does not reflect this behavior since use of a source within a problem is scored only once for that problem. A bits score does. If a person consults a particular source three times within a given problem, this is scored as three bits.

Another score generated from in-basket behavior is

competence. The more effective inquirer is assumed to reach solutions which make use of more information and which consequently specify the manner in which discrepant elements can more nearly be brought into harmony. Such solutions are judged to be more competent and therefore to reflect a deeper understanding of the problem. In the present study competence was judged on the basis of performance in ten selected problem areas. The standard against which performance was judged was formed on the basis of Es' judgments about what in each case constituted a competent solution. The standard used is given in Appendix . The competence score is the sum of competence for all the defined problem areas.

For the same reasons that a mean sources score was generated a mean competence score was generated. This score is designed to give a more accurate measure of competence for those subjects who worked on less than the full number of defined problem areas. The score is generated by dividing the competence score by the number of problem areas actually dealt with.

The theory of inquiry on which this study is based states that competence in inquiry depends on having adequate information both for problem formulation and for problem resolution. This can only be gotten by looking in many places for information, by juxtaposing information from more than one source. Shulman et al., (1968) called such behavior cognitive shifting. The degree to which in-basket subjects actually behaved this way is given by the shifts score. This score is the sum of

the times a subject moved from one source of information to another.

Finally, it was desirable to have some overall measure of inquiry performance. This was given by a score called general inquiry. To get this score problem sensitivity, competence, and sources were converted to T scores [$T \sim N(50,100)$] and summed. Thus general inquiry is a linear combination of three inquiry sub-scores.

Statistical Hypotheses

1. The dialectical group will be superior to the didactic group in all aspects of inquiry as defined by the following inquiry variables: bits, time, total sources, mean sources, shifts, problem sensitivity, competence, mean competence, and general inquiry.

This hypothesis is suggested by the theory of openness underlying this study. The open person is by definition dialectical. He surpasses the didactic in his interest in people and in environmental events. He is more accepting of ambiguity. He is less likely to distort information inputs. These qualities are all expected to facilitate performance in the in-basket.

2. The openness training group will be superior to the control group in all aspects of inquiry as defined by the following inquiry variables: problem sensitivity, competence, mean competence, bits, time, total sources, mean sources, shifts, and general inquiry.

The logic of this hypothesis rests on the assumption that the openness training will establish a set which will carry over into the in-basket situation. This set is designed

to facilitate in-basket performance.

3. The cued group will be superior to the uncued group in all aspects of inquiry as defined by the following inquiry variables: bits, time, total sources, mean sources, shifts, problem sensitivity, competence, mean competence and general inquiry.

Presumably the meaning of openness is not entirely unknown even to untrained subjects. Thus whether trained or untrained, it is expected that people who are asked to behave openly will do so to the fullest extent of their understanding of the model. To the degree that they can and will do this, inquiry performance will be improved.

The above hypotheses state that there will be significant main effects for the three factors being manipulated and/or controlled in this experiment. Following are certain other hypotheses regarding expected interactions.

4. The cued openness training group will be superior to the uncued openness training group on all aspects of inquiry.

The assumption underlying this hypothesis is that cueing has an effect over and above the set provided by the training itself. This additional effect is assumed to be identical to the effect observed in studies of achievement motivation where behavior is changed as a result of presenting S with some standard of excellence. In the present study that standard of excellence is the model of openness studied in the training sessions.

5. Didactic subjects will benefit more from openness training than will dialectical subjects.

The underlying assumption is that dialectical subjects are already open and cannot therefore benefit from openness training to the degree that didactics will benefit. They will perform well in the inquiry situation with or without training. The didactics, since they are closed by definition, will be expected to use the openness training in such a way as to improve their inquiry performance over what it would have been had they not been exposed to the training.

Summary

The present study on the training of openness and its effects on inquiry was paralled by another on the training of problem-solving skills and its effects on inquiry. Subjects for both studies were selected on the basis of their cognitive style, either dialectical or didactic. The two studies used an identical criterion task, the Teacher's In-Basket. They also used the same control group. The control group received training that was conceptually unrelated to improvement of inquiry. All training groups were equated for cognitive style of subjects, for amount of time spent and for number of sessions held. During the administration of the Teacher's In-Basket half the Ss were cued to use the training: half were uncued. Both training procedures and the criterion observations were carried out in such a way as to minimize experimenter bias. The data were analyzed using correlation and analysis of variance.

In the next chapter the results relating to the above hypotheses will be presented. These results will be discussed in the following chapter.

CHAPTER IV

RESULTS

Data were gathered in three stages and in each case for a different purpose. The first data were gathered in order to be able to select subjects along the dialectical-didactic continuum. Next, post-training data were gathered in order to assess the effect of the experimental treatment. Finally, data relevant to the hypotheses were gathered in the inquiry sessions. Since these three sets of data correspond to three distinct phases in the research and since they correspond to different, though related questions, they will be presented in three sections.

The Selection Battery

One of the major interests of this study was in investigating the differential effects of training on dialectical and didactic seekers. A procedure was designed to select two groups of subjects who would differ as much as possible on the dialectical-didactic continuum. Four measures were taken: (a) a measure of stereopathy-nonstereopathy, (b) a measure of cognitive complexity (c) a measure of political liberalism-conservatism, and (d) a measure of word fluency. Those high on all these measures were called dialectical

seekers. Those who were low on all of them were called didactic seekers. The degree to which separation of groups was actually achieved can be seen by an examination of Table 3.

TABLE 3

MEANS FOR SEEKING STYLE VARIABLES CLASSIFIED BY TRAINING GROUPS

Variable		Control Group (N=20)	Problem Solving Group (N=20)	Openness Training (N=20)
		$\bar{X}$	$\bar{X}$	$\bar{X}$
Beliefs (SD=10.69)	Dialectical	68.4	66.9	68.7
	Didactic	54.1	49.1	53.0
Complexity (SD=5.43)	Dialectical	19.1	16.9	21.4
	Didactic	11.9	11.1	12.7
Politics (SD=3.43)	Dialectical	13.9	14.6	15.9
	Didactic	11.2	10.7	11.4
Word Association (SD=16.22)	Dialectical	124.0	115.7	119.3
	Didactic	98.9	106.9	97.3

Observe that with the exception of the control group on Politics and the Problem Solving group on Word Association, the means for dialectical vs. didactic seekers are always at

least one standard deviation apart. Overall differences between didactic and dialectical seekers compare favorably with those achieved by Shulman et al., (1968) as can be seen in Table 4.

TABLE 4

MEANS AND STANDARD DEVIATIONS FOR SELECTED VARIABLES FROM TWO STUDIES OF INQUIRY

		Shulman, Loupe, & Piper		Present Study	
		Dialecticals N=21	Didactics N=25	Dialecticals N=30	Didactics N=30
Inventory of Beliefs	$\bar{X}$	65.57	54.72	68.06	52.07
	SD	7.20	7.80	7.71	6.47
Complexity	$\bar{X}$	16.09	8.28	19.13	11.90
	SD	4.22	2.25	4.24	3.85
CQT Total	$\bar{X}$	133.76	123.96	131.60	127.63
	SD	17.81	25.75	24.85	18.60
GPA	$\bar{X}$	2.68	2.61	2.68	2.55
	SD	.48	.53	.56	.51

Means and standard deviations for Word Associations and Politics do not appear in the table since these measures were not exactly comparable across studies. In the case of Word Associations the instrument was identical but the scoring procedure was slightly changed. In the case of Politics the scales in the two studies were different. Referring, then, only to beliefs and to complexity, it seems that in selecting on seeking style the results for the two studies were quite similar.

In Table 5 the intercorrelations among the four seeking style variables are given. Correlations in parentheses are those for the same variables in Shulman et al., (1968). Note that these correlations are in the same direction but are somewhat larger than those from the earlier study.

TABLE 5

MATRIX OF INTERCORRELATIONS AMONG SEEKING STYLE VARIABLES (N=60)[a]

		1	2	3	4
Beliefs	1	1.00			
Complexity	2	.62 (.50)[b]	1.00		
Politics	3	.58 (.36)	.29 (.23)	1.00	
Word Association	4	.37 (.36)	.36 (.29)	.20 (.39)	1.00

[a]For N=60, a correlation of .21 or more will occur by chance 5% of the time; a correlation of .30 or more will occur 1% of the time (two-tailed test).
[b]Correlations in parentheses from Shulman et al., (1968).

The Training Posttests

For all three training groups the post-training test battery consisted of Rokeach's Dogmatism Scale and Loupe's Problem Solving Test. In addition the control group received a test on concept learning. This last test was administered only to support the illusion communicated to the control group

that it was in fact an experimental group. The test was not scored.

The means and standard deviations for both the Dogmatism Scale and the Problem Solving Test are given in Table 6.

TABLE 6

MEANS AND STANDARD DEVIATIONS FOR POSTTEST VARIABLES

		N	$\bar{X}$	SD
Dogmatism Scale				
Training	Control	20	128.50	33.83
	Problem Solving	20	131.00	24.64
	Openness	20	119.85	22.33
Seeking Style	Dialectical	30	115.1	28.3
	Didactic	30	137.7	21.4
Problem Solving Test				
Steps				
		N	$\bar{X}$	SD
Training	Control	20	9.25	5.30
	Problem Solving	20	8.90	3.82
	Openness	20	9.70	5.23
Seeking Style	Dialectical	30	9.83	5.61
	Didactic	30	8.73	3.74
Quality				
		N	$\bar{X}$	SD
Training	Control	20	3.45	1.43
	Problem Solving	20	4.45	1.67
	Openness	20	4.20	2.61
Seeking Style	Dialectical	30	4.47	2.27
	Didactic	30	3.60	1.57

In the case of both tests, the only comparisons of interest involve the training dimension and the seeking style dimension.

Restricting our attention for the moment to the Dogmatism Scale, it may be noted that in terms of absolute value the mean for the openness group is less than that for the control group. This difference was in the expected direction. However, an analysis of variance revealed that the difference was not significant ($F=.99$, $p<.38$). The difference between the dialectical seekers and didactic seekers was significant ($F=11.12$, $p<.002$). The appropriate ANOVA tables are found in Appendix D.

Clearly there was no overall effect of openness training in producing less dogmatic people. In spite of that there were two facts that suggested the presence of a possible weak effect. First, as noted above, the mean difference between openness and control groups was in the predicted direction and second, the SD for the openness group was two-thirds that of the control group. Both of these results were consistent with the expected effects of training. It was therefore decided to attempt a more fine-grained analysis. This analysis would be aimed at discovering whether or not the training had been effective for at least some of those who had experience in openness training. It was expected it would especially help the didactics.

At the time of the administration of the selection battery, the Inventory of Beliefs had been administered to

all subjects. At that time they had been asked to respond to the inventory so as to represent their own feelings. On the second day of openness training, subjects had again been asked to respond to the inventory. This time, however, they were asked to respond as they felt an open person would. Changes in score, they were told, would represent the degree to which they had comprehended the model of openness which had been presented to them.

With these two inventory measures in hand it was decided to calculate a change score by subtracting the first score from the second. These change scores were then plotted against scores on the Dogmatism Scale. The plot revealed very clearly that for didactic subjects only, there was a negative relation between degree of change and degree of dogmatism. The more they changed in the direction of openness on the Inventory of Beliefs, the less dogmatic they became. A Pearson Product-Moment correlation coefficient was computed to measure the strength of the relation. The correlation was -.55. For N=10 this correlation is significant ($p < .05$, two-tailed test).

Turning to the posttest differences between the two selection groups, the mean difference in dogmatism tended to confirm the supposition that was made in using the Dogmatism Scale as a posttest, namely, that the construct openmindedness-closedmindedness is closely related to the other dichotomies which make up the model of openness-closedness. The degree of correlation between dogmatism

and the variables which define the dimension of dialecticism-didacticism tend to support this also. Those correlations are given in Table 7.

TABLE 7

CORRELATION OF DOGMATISM WITH SEEKING STYLE VARIABLES (N=60)[a]

Seeking Style Variables	Dogmatism
Inventory of Beliefs	-.59
Complexity	-.29
Politics	-.38
Word Association	-.00

[a]For N=60, a correlation of .21 or more will occur by chance 5% of the time; a correlation of .30 or more will occur 1% of the time (two-tailed test).

The fact that the correlations are negative is appropriate since low scores on the Dogmatism Scale indicate a less dogmatic stance. In other words, lower scores on the scale are associated with higher scores on the seeking style variables.

Turning now to results of the Problem Solving Test one can see by inspecting the means in Table 6 that for both steps and quality the openness training group was higher than the training group. These differences were in the expected direction. An analysis of variance revealed that the differences were not significant, however.

Examining the means on problem solving for the seeking style dimension it is seen that for both steps and quality the differences are small. As would be expected, the differences favor the dialectical seekers. In neither case was the difference significant.

Results Relating to Inquiry

The first hypothesis states that the dialectical group will be superior to the didactic group in all aspects of inquiry. The means and standard deviations relating to this hypothesis are given in Table 8. Despite the fact that all mean scores (with few exceptions) are in the predicted direction, analysis of variance revealed that there were no significant differences.

TABLE 8

MEANS AND STANDARD DEVIATIONS FOR INQUIRY VARIABLES CLASSIFIED BY SEEKING STYLE

Variables	Dialectical Seekers		Didactic Seekers	
	$\bar{X}$	SD	$\bar{X}$	SD
Bits	189.87	52.14	183.23	50.27
Time	133.07	35.92	125.63	27.15
Total Sources	57.40	13.21	54.63	11.24
Mean Sources	5.84	1.24	5.70	1.11
Shifts	129.60	53.71	129.10	44.89
Problem Sensitivity	78.10	16.35	76.10	17.37
Competence	26.33	3.04	26.03	4.21
Mean Competence	2.78	.32	2.79	.36
General Inquiry	152.20	24.23	147.97	25.97
Bits/Time	1.49	.34	1.48	.34
Shifts/Time	.99	.30	1.04	.33
Problems/Time	.62	.15	.62	.16

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Note that on Table 6 three variables have been included that were not previously mentioned. These were created post hoc to aid in analysis. They were created by using existing defined scores, bits, shifts, and problem sensitivity; dividing these scores by the amount of time spent in inquiry, thus giving a reading of the number of bits processed, number of shifts, and number of problems sensed per unit of time (the unit being one minute).

The second hypothesis states that the openness training group will be superior to the control training group in all aspects of inquiry. The appropriate means and standard deviations are given in Table 9.

TABLE 9

MEANS AND STANDARD DEVIATIONS FOR INQUIRY VARIABLES CLASSIFIED BY TRAINING

Variables	Openness Training		Control Training	
	$\bar{X}$	SD	$\bar{X}$	SD
Bits	202.10	54.61	170.90	46.40
Time	139.70	37.91	119.10	29.37
Total Sources	55.90	11.80	53.40	12.29
Mean Sources	5.44	1.11	5.61	1.22
Shifts	137.70	54.23	113.30	42.04
Problem Sensitivity	77.20	19.19	75.50	16.61
Competence	26.70	3.97	25.50	3.36
Mean Competence	2.71	.39	2.75	.26
General Inquiry	151.50	28.33	144.90	24.91
Bits/Time	1.52	.31	1.47	.33
Shifts/Time	1.02	.30	.95	.25
Problems/Time	.58	.14	.65	.15

Although all differences are again, with few exceptions, in the predicted direction, an analysis of variance revealed no significant differences.

The third hypothesis states that the cued group will be superior to the uncued group in all aspects of inquiry. The means and standard deviations are given in Table 10. There were no significant differences. If anything, scores appear to lean in the opposite direction.

TABLE 10

MEANS AND STANDARD DEVIATIONS FOR INQUIRY VARIABLES CLASSIFIED BY CUEING

Variables	Cued Group		Non-Cued Group	
	$\bar{X}$	SD	$\bar{X}$	SD
Bits	184.77	45.08	188.33	56.83
Time	126.73	33.74	131.96	30.05
Total Sources	55.13	11.07	56.90	13.44
Mean Sources	5.75	1.15	5.79	1.21
Shifts	127.26	44.20	131.43	54.20
Problem Sensitivity	76.30	17.59	77.90	16.13
Competence	26.10	3.76	26.26	3.59
Mean Competence	2.81	.38	2.75	.28
General Inquiry	148.76	25.36	151.40	24.98
Bits/Time	1.53	.36	1.44	.30
Shifts/Time	1.05	.35	.98	.28
Problems/Time	.64	.17	.61	.14

The fourth hypothesis states that the cued-openness training group will be superior to the uncued-openness training group in all aspects on inquiry. This is a statement about a training X cueing interaction. An

analysis of variance revealed a significant interaction on two inquiry variables: problem sensitivity ($F=4.50$, $p<.02$) and general inquiry ($F=3.47$, $p<.04$). The appropriate ANOVA tables are found in Appendix D. The means and standard deviations are given in Table 11.

TABLE 11

MEANS AND STANDARD DEVIATIONS RELATED TO TREATMENT X CUEING INTERACTION[a]

	Problem Sensitivity	
	Openness Training	Problem Solving Training
Cue	67.4 (21.2)	80.4 (15.5)
No Cue	86.9 (10.7)	70.6 (14.6)

	General Inquiry	
	Openness Training	Problem Solving Training
Cue	138.0 (30.2)	149.7 (25.1)
No Cue	164.9 (20.3)	140.1 (18.1)

[a]In each cell, the number in parentheses is the SD; the other is the mean.

Inspection of the means indicates that the interaction was in exactly the opposite direction of what had been predicted.

The last hypothesis states that didactic subjects will benefit more from openness training than will dialectical subjects. This is a statement that an interaction will occur between seeking style and cueing, an interaction favoring didactic subjects. No such an interaction occurred.

TABLE 12

CORRELATIONS OF SEEKING STYLE VARIABLES WITH INQUIRY VARIABLES (N=60)[a]

Inquiry Variables	Inventory of Beliefs	Complexity	Politics	Word Association
Bits	.14	.14	.14	.19
Time	.02	.13	.05	.14
Total Sources	.12	-.04	-.00	.35
Mean Sources	.03	-.10	-.05	.26
Shifts	.07	.01	.07	.11
Problem Sensitivity	.02	-.04	-.04	.14
Competence	.02	.02	-.05	.18
Mean Competence	-.04	-.09	-.13	.13
General Inquiry	.07	-.02	-.04	.26
Bits/Time	.15	.06	.14	.05
Shifts/Time	.04	-.08	.05	-.01
Problems/Time	-.01	-.14	-.04	-.01

[a]For N=60, a correlation of .21 or more will occur by chance 5% of the time; a correlation of .30 or more will occur 1% of the time (two-tailed test).

This concludes a presentation of data related directly to the hypotheses. Another area of interest concerns the nature and degree of relationships between the seeking style variables and the inquiry variables. These relations are given in Table 12. With the exception of Word Association the correlations between the two sets of variables are not different from zero.

At the conclusion of the data gathering phase of this study, information regarding the subject's academic aptitude was gathered from the Office of Evaluation Services. The information consisted of College Qualification Test scores and Michigan State University Reading scores. The interest here was in assessing the degree of relationship between aptitude variables and inquiry variables. The degree and direction of the relations are given in Table 13. Inspection of the table indicates that, in general, the relationship between academic aptitude and inquiry, though rather weak, is substantially stronger than the relationship between seeking style variables and inquiry. Interestingly, Word Association, the seeking style variable most strongly related to inquiry is also strongly related to academic aptitude. The correlation of Word Association with Michigan State University Reading is .40, with CQT Verbal is .21, with CQT Information is .18, with CQT Numerical is .19, and with CQT Total is .26.

TABLE 13

CORRELATIONS OF ACADEMIC APTITUDE VARIABLES WITH INQUIRY VARIABLES (N=60)[a]

Inquiry Variables	MSU Reading	CQT Verbal	CQT Information	CQT Numerical	CQT Total
Bits	.11	.09	.06	.07	.10
Time	-.02	-.03	-.04	-.10	-.07
Total Sources	.25	.20	.08	.27	.25
Mean Sources	.26	.16	.05	.41	.28
Shifts	.06	.02	-.06	.12	.04
Problem Sensitivity	.36	.30	.22	.18	.31
Competence	.27	.04	.13	.18	.14
Mean Competence	.32	.09	.10	.24	.18
General Inquiry	.35	.22	.17	.25	.18
Bits/Time	.12	.10	.11	.11	.14
Shifts/Time	.06	.00	-.04	.18	.07
Problems/Time	.33	.26	.25	.20	.31

[a]For N=60, a correlation of .21 or more will occur by chance 5% of the time; a correlation of .30 or more will occur 1% of the time (two-tailed test).

While dealing with the issue of relationships among variables within this study, there is one last relation which is of importance. That is the relation between the measure of dogmatism and measures of inquiry. This relation is given in Table 14. Apparently dogmatism as measured by the Dogmatism Scale is unrelated to inquiry as measured in this study. This may be due to the fact that through training, variability in dogmatism had been reduced, thus reducing the degree of correlation.

TABLE 14

CORRELATIONS BETWEEN DOGMATISM AND INQUIRY VARIABLES (N=60)a

Inquiry Variables	Dogmatism
Bits	-.07
Time	-.08
Total Sources	-.11
Mean Sources	-.06
Shifts	-.06
Problem Sensitivity	-.07
Competence	-.12
Mean Competence	-.08
General Inquiry	-.12
Bits/Time	-.05
Shifts/Time	-.02
Problems/Time	.01

[a]For N=60, a correlation of .21 or more will occur by chance 5% of the time; a correlation of .30 or more will occur 1% of the time (two-tailed test).

Summary

Inspection of the results indicates that the hypotheses enumerated in Chapter III were not supported. One hypothesis was even reversed. In the next chapter these results are discussed.

CHAPTER V

DISCUSSION

It was clear from the results presented in Chapter IV that the hypotheses in Chapter III went largely unconfirmed. For some this would be a signal to stop working. But this, a dissertation on inquiry, is itself an inquiry. The situation before us is, in Dewey's terms, indeterminate and demands further inquiry. The task ahead is to transform this indeterminate situation into one which is determined in the sense that the elements and their relations have been defined.

The chapter is divided into four sections: (a) seeking style and inquiry, (b) training and inquiry, (c) academic aptitude and inquiry, and (d) cueing and inquiry.

Seeking Style and Inquiry

The fact that there were no differences in inquiry between dialectical and didactic seekers was one surprising result of the present study. It was surprising because in two previous studies (Shulman, 1963; Shulman et al., 1968) seeking style had been shown to be a powerful determinant of inquiry. As was seen from Table 4 the degree of separation on seeking style variables between dialectical and

didactic seekers was at least as great in the present study as in the previous studies. The discrepancy between these results and those of the earlier work needed some investigation. Three possible explanatory hypotheses were examined. One was that there had originally been a difference between the groups but that training had reduced or eliminated it. The second one was that the two groups were not sufficiently different to begin with. A third was that seeking style is an effective variable only for those subjects who have an equal knowledge base, that such a base did not exist in this sample.

First, let us examine the hypothesis that training in openness was more effective for didactic than for dialectical subjects, resulting in their being able to close the distance between themselves and their dialectical counterparts. This may be called the "catch-up" hypothesis.

Evidence pointing in this direction has already been presented in Chapter III. When the gain scores of didactic subjects on the Inventory of Beliefs were considered in relation to dogmatism scores, a strong positive correlation was noted. If gain scores are correlated with a measure of openness and if openness is facilitative of inquiry, then gain scores might also be expected to correlate with inquiry scores. This possibility was tested for the ten didactic subjects who had participated in openness training. Results were negative. The Product Moment correlation coefficient was .17.

This analysis was suggestive but for two reasons it was objectionable. In the first place, gain scores are typically unreliable. The person who is lowest stands to gain most simply as a function of where he started. He may still end up below a person who has changed much less. In the second place, the Pearson Product-Moment correlation coefficient tends to be unstable for small N.

Consequently these data were analyzed again using the Spearman Rank correlation coefficient. This coefficient is recommended for use either with small N or when the level of measurement is no higher than ordinal.

For this particular analysis the only variables examined were Inventory of Beliefs (first administration), Inventory of Beliefs (second administration), Dogmatism, and General Inquiry. The purpose was, as stated earlier, to test for any differential effects of training. The results are displayed in Table 15.

Looking at results for dialecticals, it can be seen that from administration one to administration two of the Inventory of Beliefs the ranks changed very little. Thus when these administrations were correlated with either Dogmatism or General Inquiry, the correlation coefficients were very similar and negligible. The correlation between ranks on Dogmatism and General Inquiry approached significance.

The picture is quite different for didactics. Between first administration and second administration of the Inventory of Beliefs, considerable changes in ranks had occurred

as indicated by the low correlation between the two. This same thing was reflected in the differential correlations of the two administrations with both Dogmatism and General Inquiry. Rankings on the Inventory of Beliefs after training were positively correlated with rankings on both criterion variables. Finally, ranks on Dogmatism were positively correlated with ranks on General Inquiry.

TABLE 15

SPEARMAN RANK CORRELATIONS AMONG INVENTORY OF BELIEFS, DOGMATISM SCALE, AND GENERAL INQUIRY (N=10)[a]

I of B 1	1	1.00					
I of B 2	2	.21 (.91)[b]		1.00			
Dogmatism	3	-.27 (-.10)		.37 (-.01)		1.00	
General Inquiry	4	-.45 (.05)		.48 (-.11)		.45 (.51)	1.00
		1		2		3	4

[a]For N=10, a correlation of .564 or more will occur by chance 5% of the time; a correlation of .746 or more will occur 1% of the time.

[b]Correlations within parentheses are for dialectical subjects; the others are for didactic subjects.

These relations can only be accepted as suggestive since, because of the small numbers of subjects involved, only one of the correlations was significant. They were consistent with the hypothesis that didactic subjects were likely to benefit from training in openness more than were dialectical subjects.

Another approach was tried. This time scatterplots were made which showed relationships among the following variables: (a) dogmatism, (b) general inquiry, and (c) CQT total scores. These plots were examined person by person, group against group. This scatterplot analysis revealed a very strong relation between academic aptitude and general inquiry. Twenty-one of the 40 subjects examined rated high on general inquiry. Of these 21 subjects, 15 were also high on academic aptitude. This strong relation between academic aptitude and inquiry shows up in other parts of the study and is discussed fully in another section.

It seems that there may have been a small effect of training which favored the didactic subjects. This was not sufficient in itself to explain the differences between this study and the earlier studies in obtained results.

There is another aspect of this hypothesis that deserves mention and that is the possibility that any training at all may have eliminated the effectiveness of the seeking style variable. That is, training itself may have had the effect of increasing all the subject' commitment to inquiry to such a degree that seeking style was no longer a relevant variable. This would mean that seeking style is a rather fragile variable which may be observed only when no experimental treatment is involved, that is, in a more "natural" situation.

If this is true, what would happen if one took more extreme types of seekers? If seeking style were manipulated in an even more extreme way than was done in this study and

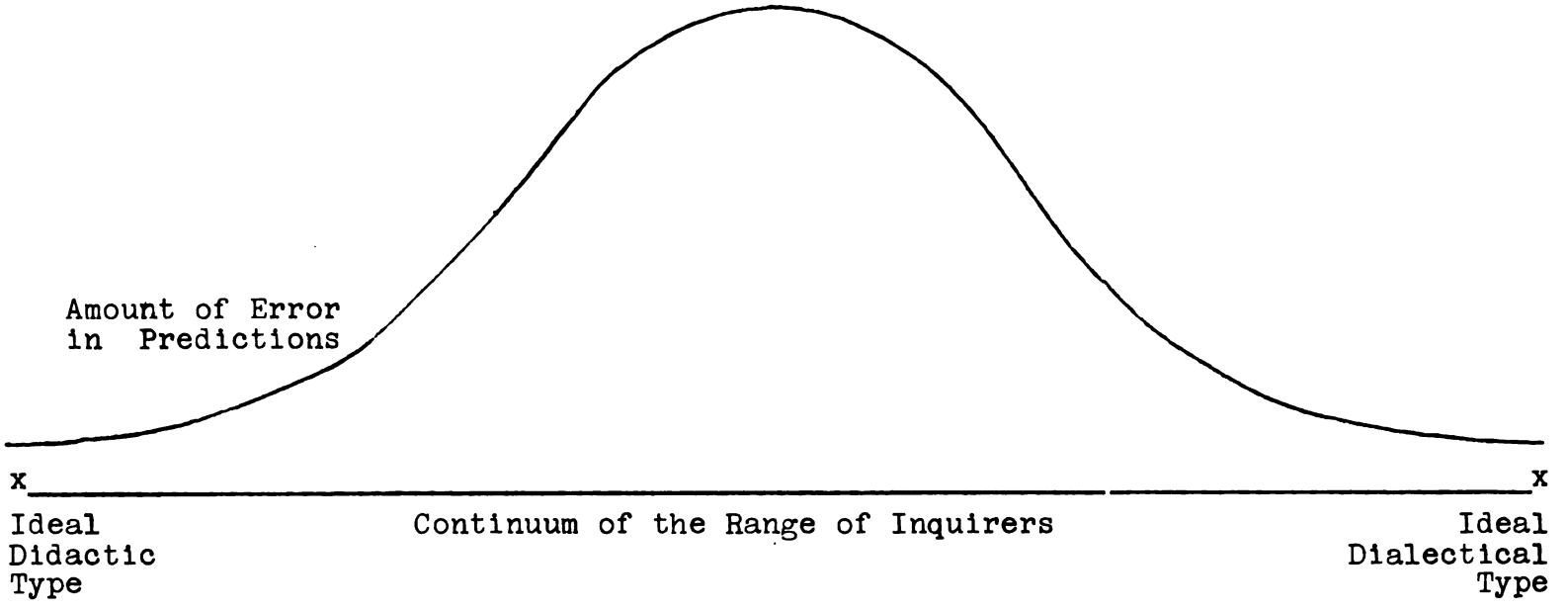
earlier ones, if the two groups were sufficiently different would differences in inquiry due to seeking style reappear in spite of the application of treatment variables. In order to examine this hypothesis it is necessary to define what is meant by "sufficiently different".

Figure 1 reproduces a figure from Shulman et al., (1968) which depicts the amount of expected error variance in predictions of inquiry performance. At the polar extremes are the dialectical and didactic ideal types. According to the figure, when one is confronted by one of the extreme types, the probability of making an error of prediction is relatively small. But as one approaches the center of the distribution, that is, as one encounters people who differ more and more from the ideal types, the probability of making prediction errors grows very large. Essentially, then, the question of what one means by "sufficiently different" boils down to a question of the amount of prediction error one is willing to tolerate. It is the researcher's responsibility to set cut-off points on the distribution beyond which he is not willing to go.

An example of this type of approach was cited in Chapter II. Stern et al., (1956) wanted to study the differences between the theoretical polar types called stereopaths and non-stereopaths. The Inventory of Beliefs was administered to a large sample of subjects. Cut-off points were established at ± 1 standard deviation from the mean. All subjects above the upper cut-off point were arbitrarily

FIGURE 1

THE THEORETICAL RELATIONSHIP OF APPROXIMATION TO AN IDEAL POLAR TYPE (DIALECTICAL OR DIDACTIC) AND THE AMOUNT OF ERROR VARIANCE IN PREDICTIONS MADE OF INQUIRY PERFORMANCE



designated as non-stereopaths. All subjects below the lower cut-off point were designated as stereopaths. The middle 68% was dropped from the study. For Stern et al., (1956) "sufficiently different" was defined as at least two standard deviations apart.

These considerations suggested that it would be wise to examine the present selection procedure and its results. The experimental sample was chosen from an available population of restricted size. The procedure used for drawing the sample was designed to give two groups which would be as different as possible. What was possible, given the conditions of the study, may have turned out to be far from desirable. By the time all the cells were filled there was considerable overlap between groups (though no more than was experienced in previous studies). For example, if one examines initial scores for the Inventory of Beliefs, he finds that somewhat more than half of the 60 subjects lay within the range where the theoretical probability of prediction error is greatest. Only 15 subjects were at least as high as one standard deviation above the mean and only 12 subjects were at least as low as one standard deviation below.

Let us consider what might have happened if it had been possible to maintain in the present study a selection criterion as rigorous as that used by Stern, et al. This can be done, though without statistical precision, by considering just the subjects who had a score on the Inventory

of Beliefs that was ≥68 or ≤51. This division gives 15 subjects in a lower group and 15 in an upper group. These two groups are almost two standard deviations apart. Means for these subjects are found in Table 16.

TABLE 16

MEANS FOR GENERAL INQUIRY AND CQT TOTAL CLASSIFIED BY SEEKING STYLE AND TRAINING GROUP (N=30)

	Control Group	Problem Solving Group	Openness Group
Didactic Seekers	N=3	N=7	N=5
	$\bar{X}$	$\bar{X}$	$\bar{X}$
	136.67 (131.33)[a]	149.14 (125.71)	167.20 (123.40)
Dialectical Seekers	N=6	N=3	N=6
	$\bar{X}$	$\bar{X}$	$\bar{X}$
	142.85 (135.50)	158.33 (120.00)	158.33 (136.50)

[a]Means within parentheses are for CQT Total; the other means are for General Inquiry.

This gives an entirely new look to the situation. One begins to see what looks like effects both of seeking style and of training. If, as seems likely, selecting this way results in a decrease in within groups variability the probability of observing significant differences is greatly increased.

One might suspect that these differences were due not

to seeking style but rather to differences in academic aptitude. An inspection of the means for CQT Total in Table 14 reveals that this can hardly be the case since the better inquirers tend on the whole to be somewhat less intelligent.

A third hypothesis dealing with the problem of no significant differences on the seeking style dimension was advanced. This was that seeking style may be a powerful variable only after subjects have been equated for a knowledge base. In Shulman et al., (1968) the subjects had been largely seniors in college. The subjects in the present experiment were largely sophomores. Hence between the samples for the two studies there must have been large differences in knowledge about educational matters relevant to inquiry in the Teacher's In-Basket, things like knowledge of how to interpret achievement scores and other kinds of information that appear on the in-basket materials.

This section began with a question about why there were no significant differences in inquiry between dialectical vs. didactic seekers. Three hypotheses were examined; all seemed reasonable. Probably all the factors discussed interacted to produce the effect. Treatment, even for controls, may have acted to increase commitment to inquiry in such a way as to reduce differences on the seeking style dimension. In addition, the openness treatment may have been somewhat more effective for didactic than for dialectical seekers. There is a suggestion that had the seeking style groups been more extreme, effects for that might still have been observed.

Training and Inquiry

The present study was designed with three levels of training but in spite of that, not all possible comparisons were of interest. In fact, only two comparisons were ever intended; problem solving training vs. control training and openness training vs. control training. The most natural mode of analysis for two such comparisons would have been planned comparisons. Only too late did E become aware of the fact that these two comparisons are not independent and that as a consequence only one of them could legitimately be made. Since the study was being handled by two different researchers each of whom wished to make the comparison relevant to his study, the planned comparisons method was dropped in favor of an overall analysis of variance for each dependent variable separately. It was this analysis that was reported in Chapter IV.

Ordinarily, follow-up analyses would use the post hoc comparison method which permits any number of comparisons. However, this method is permissible only if the analysis of variance has located some significant differences and the researcher wants to ascertain where the differences are. In addition, when the analysis of variance indicates that there are no significant differences, post hoc analyses only confirm the finding.

Thus, in order to examine the data further, it was decided to analyze just those differences of interest to the present study, namely, openness training vs. control training.

This would be equivalent to treating the study as though it were designed as a 2 X 2 X 2, that is, as though the problem solving training were not an integral part of the overall study. Analyses reported in this section were carried out under these restraints.

In Chapter IV it was observed that there was not sufficient evidence to reject the null hypothesis of no effect for training. There were, however, two differences which were rather large and which approached significance, Time ($F=1.90$, p .16) and Bits ($F=1.94$, p .16). They involved variables which are of deep interest in relation to the theory of inquiry under study. When they were analyzed again, ignoring the problem solving group, these differences were significant or near-significant. For Time, $F=3.80$ ($p<.06$) and for Bits, $F=3.88$ ($p<.05$). The differences were in the predicted direction.

In previous theorizing about inquiry (Shulman, 1963; Shulman et al., 1968) the concept of time spent in inquiry had important status. The time a subject spent working on the in-basket task was taken as an operational indicator of the subject's willingness to inquire which, in turn, was thought to be related to his tolerance, even liking, for ambiguity and complexity. The status of the time variable within the theory was given by Shulman:

> This picture of inquiry makes the inquiry process analogous in some ways to the operation of a camera. There are three dimensions which determine the clarity of the picture taken by a camera. The first is the amount of time the shutter remains

> open. The second is the quality of the lens. The third is the sensitivity or speed of the film used in the camera. All things being equal, the longer the shutter is left open, the stronger the impression made by the light on the film. If the shutter is open adequately, but the lens distorts the image, the total impression is lost. If the shutter is not open, no level of film sensitivity will lead to a good impression.
>
> We see time as analogous to shutter speed, problem sensitivity to focal resolution of the lens and film speed to inquiry competence (Shulman et al., 1968, pp. 96-97).

Thus, time spent in inquiry was conceptualized as one of three key factors in the process. When these three functioned together in an optimal way, competent inquiry was said to result.

The theory also gave a hint about the way in which these three factors interact. It was hypothesized that "time . . . most directly influences the problem sensitivity score (ibid., p.96)." That is, the data up to that time had indicated that a high amount of time spent in inquiry was associated with a high number of problems sensed. Correlations between the two variables had ranged from .46 to .69. In the present study the correlation was .41.

Now it seems that the relation between time and problem sensitivity, though strong, may not be as automatic as it once seemed. If the two variables had acted in concert as predicted by the theory the observed increase in time might have been expected to result in an increase in problem sensitivity. This did not happen. The results of this study make it appear that the two factors operate independently.

This raises certain questions about what kinds of things do influence problem sensitivity. It also raises questions about the limits of the usefulness of openness training. The question that needs an answer is this: can problem sensitivity best be conceptualized as a generalized process variable or as a series of learned discriminations or both?

Certain observations made during in-basket sessions gave credence to the hypothesis that problem sensitivity, if not reduced to learned discriminations, at least has a high learning component. The observations referred to were of the following type. Subject A looks at a report card which has grades in the C to D range. She says, "It looks like this one is doing all right." Subject B looks at the very same stimulus and says, "This is awful. Something must be wrong." If that particular stimulus array happens to be listed in the problem manual as a problem, B's problem sensitivity score is incremented by one while A's remains the same. For that one problem B is more problem sensitive than A. Or is she?

That, of course, is the point. Were the reactions of A and B to the stimulus simply a function of their learning? Does the problem sensitivity score on the Teacher's In-Basket simply reward the person who has learned more of education's consensually-shared discriminations? The position taken here is that learning within a particular field interacts with the generalized characteristic called problem sensitivity to produce the problem sensitive person.

The absence of one or the other of the two components would result in a person who in his behavior would appear rather insensitive to discrepancies, or, as Dewey would have it, to indeterminate situations.

This gives at least one way of explaining why openness training had no effect on problem sensitivity. It was a very generalized training procedure. The in-basket was very specifically related to a particular kind of teacher behavior. There was nothing in the training procedure to help the subjects make the specific professional discriminations which were outlined in the in-basket problem manual. Therefore, the fact that there was no effect on problem sensitivity is not surprising. Whether the training procedure resulted in some increase in that generalized cognitive characteristic which when combined with learned discriminations results in problem sensitive behavior is a moot question.

The fact that the openness group processed more bits of information seems to have been simply a function of the time spent. Ordinarily one would associate more bits with more information. This should in turn lead to more competent solutions. But it did not. This may again be due to the fact that proper discriminations were not available to the subjects.

Most of what these data tell us was already anticipated by Shulman:

> We will speculate on the nature of the inquiry process . . .
> . . . . . .
> It seems that the inquiry process involves at least two stages. The first stage is the commitment to involve oneself in inquiry. This is what occurs when the individual decides to open himself up to engage in the inquiry process. The second stage occurs when, having opened himself up to whatever extent he had determined, he engages in the sensing, formulating, searching, and resolving aspects of inquiry (Shulman et al., 1968, p. 96).

Surely the present results have underlined this analysis with emphasis. The manipulation of openness through training had its only effects in increasing time spent in inquiry, that is, commitment. Additional time spent had little effect on the processes of problem sensing, etc. This fact speaks both for the legitimacy of the two-stage inquiry model and also for the relative independence of the two stages.

Academic Aptitude and Inquiry

The general conclusion from previous studies of inquiry (Shulman, 1963; Shulman et a., 1968) had been that academic aptitude is not as important a determiner of inquiry behavior as are other more general personality variables like cognitive complexity, allocentricity and others already mentioned. Support for this conclusion came from analyses of correlations between scores on tests of academic aptitude and in-basket inquiry scores. In Shulman et al., the correlation between General Inquiry and CQT Total was .19 and .17. In the same study analyses using the regression

technique showed that academic aptitude typically accounted for less than 10% of the variance in inquiry behavior.

In the present study the above conclusions seem to have been supported. The correlation here between CQT Total and General Inquiry was .28.

Normally this is all that would have been said about this relation since academic aptitude was not one of the variables under test. But by a rare accident of random assignment, people were assigned to cells in such a way as to produce wide discrepancies between cells apparently without affecting the test of the independent variables. Note in Table 17 the reasonably even distribution of academic ability across treatments.

TABLE 17

MEANS AND STANDARD DEVIATIONS FOR CQT TOTAL CLASSIFIED BY TREATMENT (N=60)

Variable		$\bar{X}$	SD
Seeking Style	Dialectical	131.60	
	Didactic	127.63	
Training	Control	131.10	
	Problem Solving	129.65	
	Openness	128.10	
Cueing	Cue	128.33	
	No Cue	130.90	

Now compare that with the very unequal distribution of academic aptitude between cells in Table 18.

TABLE 18

DISTRIBUTION OF ACADEMIC APTITUDE AMONG CELLS--CQT TOTAL

		Control Training	Problem Solving Training	Openness Training
Dialectical	Cue	147.6	133.0	122.0
	No Cue	117.4	129.2	140.4
Didactic	Cue	126.0	124.4	117.0
	No Cue	133.4	132.0	133.0

This unequal distribution provided the opportunity to ask about the effect of academic aptitude when differences become large. An answer to the question is given by Figure 2.

It appears that when differences on academic aptitude are very large, there are corresponding differences in inquiry behavior and dogmatism. High aptitude was associated both with high inquiry and with low dogmatism and vice versa.

There may have been some unfortunate consequences for this study as a result of the assignment of three low aptitude subjects to the dialectical-cued-openness cell. The three constituted a majority and pulled down the performance not

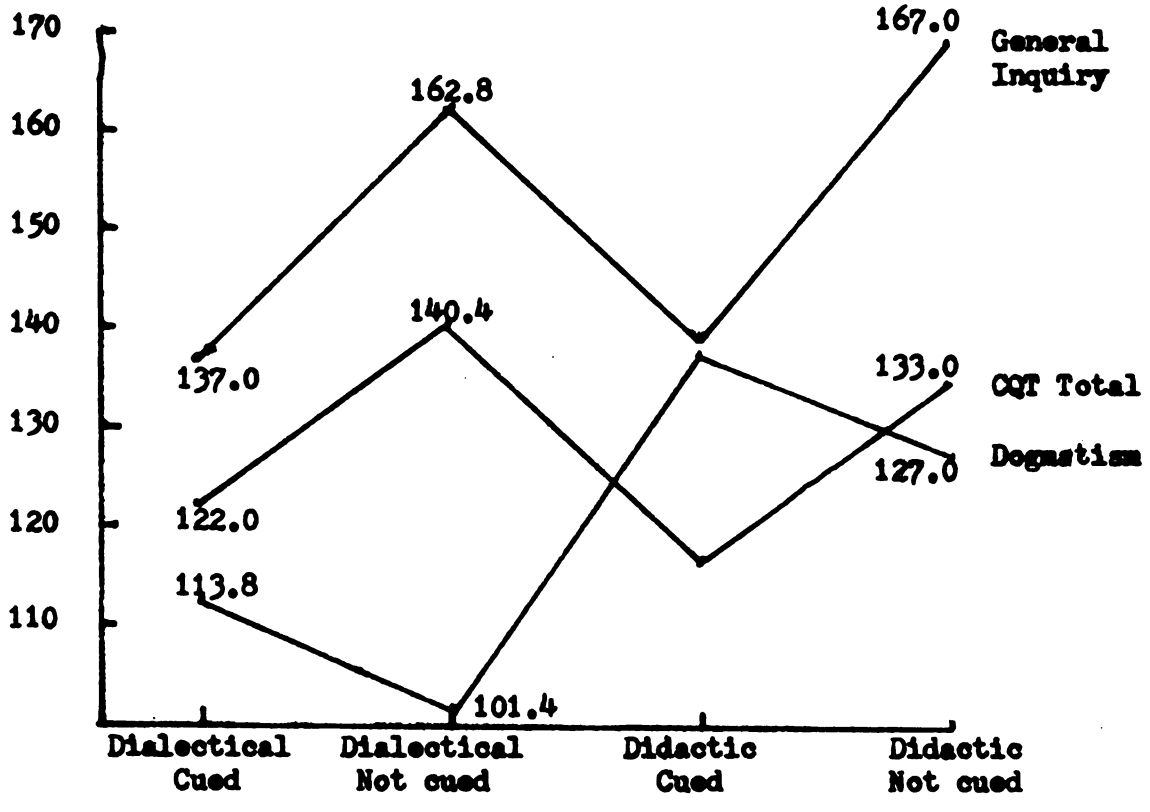


FIGURE 2

PLOT OF CELL MEANS ON CQT TOTAL, GENERAL INQUIRY, AND DOGMATISM FOR OPENNESS TRAINING GROUP

only of their cell but also of the entire dialectical group. Evidence of this negative effect came in the two interactions for problem sensitivity and general inquiry involving treatment and cueing. That these two interactions are almost entirely an artifact of pitting two low aptitude groups against two high aptitude groups is attested by the means in Table 19. The interaction is plotted in Figure 3.

TABLE 19

PROBLEM SENSITIVITY MEANS FOR CELLS CLASSIFIED BY SEEKING STYLE, TREATMENT AND CUEING

		Control Training	Problem Solving Training	Openness Training
Dialectical	Cue	82.4	83.6	66.6
	No Cue	68.0	83.8	84.2
Didactic	Cue	78.4	78.6	68.2
	No Cue	73.2	68.6	89.6

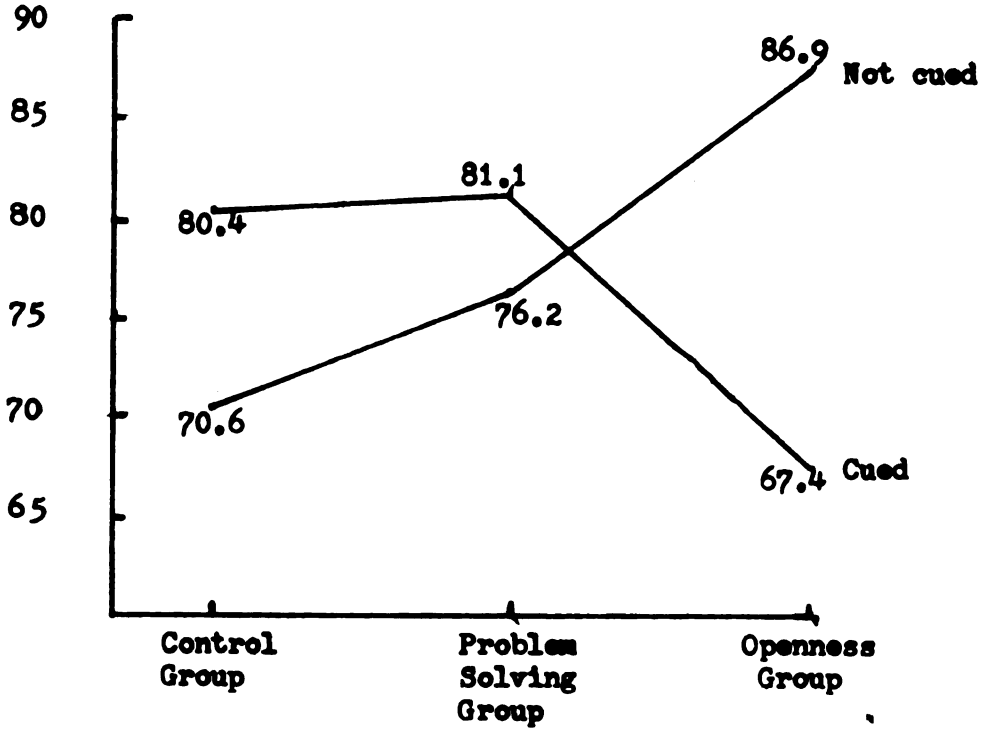


FIGURE 3

PLOT OF TREATMENT BY CUEING INTERACTION FOR PROBLEM SENSITIVITY

Exactly the same kind of thing holds in the treatment by cueing interaction for General Inquiry. The interactions have absolutely no meaning for the theory of inquiry.

It seems, then, that academic aptitude does play a role in inquiry when differences in aptitude become extreme. Any future studies will have to take this into account.

Cueing and Inquiry

At the time that this study was being designed it seemed quite reasonable to suppose that cueing subjects to make use of their training would influence them in the direction of more effective behavior. There was a solid precedent within the experimental tradition to indicate that this was so. It was a surprise, then, to discover that here there was no detectable effect. Why might this be so?

The answer may lie in differences in task complexity. Those experimental situations where cueing has functioned powerfully have typically been of a relatively simple type, that is, relative to an experiment like the present one. A subject walks in to the laboratory with little or no forewarning about what he will be expected to do. He is given a problem along with some cue or strategy which, he is told, will aid him in the solution.

In contrast to this kind of situation, the present experiment went through an elaborate selection procedure.

People in the screening population were told that on the basis of certain demonstrated cognitive characteristics some of them would be chosen for further participation. Later, those who were chosen went through a substantial training and testing exercise involving four hours spread over four days. Finally they were asked to participate in the in-basket.

Given these circumstances it seems most probable that all subjects went into the in-basket self-instructed according to the way they interpreted the experiment. In brief, the point that is being sustained is that all subjects were cued. The experimental "cue" simply got lost.

The summary and conclusions will be presented in the next chapter.

CHAPTER VI

SUMMARY AND CONCLUSIONS

The purpose of the present study was to assess the effects of training in openness on inquiry behavior. Also of substantive interest were the effects of seeking style and cueing on inquiry. The study can be envisioned as a pretest-posttest design.

The pretest phase consisted of a selection battery of tests which was used to select 60 subjects for further study. The subjects were selected to approximate two seeking styles, dialectical seeking and didactic seeking with 30 subjects in each of the two categories. Seeking style was thus one factor with two levels.

There were three experimental treatments, two of which were theoretically relevant to inquiry. One of the relevant treatments was training in problem solving; the other was training in openness. The third treatment was, of course, a control supposedly irrelevant for inquiry. Treatment was thus a second factor with three levels.

The present study treats only the training of openness. For an explanation on the effects of training in problem solving on inquiry, the interested reader should consult the dissertation by Michael J. Loupe.

Following the treatments the posttests were given.

They consisted of Loupe's Problem Solving Test, Rokeach's Dogmatism Scale, and Shulman's Teacher's In-Basket. Within the in-basket sessions half the subjects were cued to make use of their training; the other half was not cued. Thus cueing was a third factor with two levels.

In general the independent variables were not powerful. The reasons for these results were largely drawn from the data themselves and discussed.

The most probable reason for no effects due to seeking style was that the two groups had not been sufficiently different to begin with. The recommendation for any future study making use of the seeking style continuum would be to make sure that subjects are sufficiently different that prediction error is reduced to tolerable limits.

Effects of openness training were seen in the greater willingness of openness subjects to spend more time in inquiry and to process more bits of information in the process. In spite of this there was no appreciable increase in problem sensitivity. The interpretation given to this fact was that problem sensitivity is made up of two components: (a) a general sensitivity to the discrepant combined with (b) field-specific learned discriminations. If this is true then there was never any reason to expect that openness training would have much effect on the major goal of inquiry which is competence. Inquiry competence itself must be seen as an interaction between seeking style and learning.

There was no effect for cueing. The training was itself

a cue. To include such a variable in any future study of inquiry would be inadvisable.

One finding, unrelated to any hypotheses, was that intelligence seems to affect inquiry the more one departs from the mean. In this study subjects who were low in academic aptitude were more likely to be low in inquiry and vice versa. It would therefore be wise in any future studies of inquiry to establish control over this variable.

Implications for Theory

This research has attempted to investigate some relationships between two theories: (a) a theory of inquiry and (b) a theory of openness.

The theory of inquiry was that put forward by Dewey and modified by Shulman. It divides the process of inquiry into four sub-processes: (a) problem sensing, (b) problem formulation, (c) search, and (d) resolution.

The theory of openness was formed by integrating four personality models into one. The theory of openness tries to describe the manner in which certain kinds of people relate to four different areas of experience: (a) ideas and intellectual abstractions, (b) social groups, (c) other persons, and (d) self.

The results of training of openness have shown no demonstrable effects at all on any of the four sub-processes outlined by Shulman. By definition the whole process of

inquiry begins with problem sensing. People trained in concept learning were as effective in doing this as were people trained in openness.

This is not to say that openness training had no effect on inquiry at all. It has already been stated that one of the important prerequisites for inquiry to occur at all is for the inquirer to be willing to encounter and deal with the discrepant and the ambiguous. The best measure of this willingness to inquire is time spent in inquiry. The people trained in openness did, by this definition, become potentially better inquirers than the control subjects.

Dewey has said that for inquiry to occur there has to be an indeterminate situation. What is emphasized here is that there must also be a co-occurence of willingness in the inquirer to encounter and deal with that indeterminate situation. Thus openness training can be viewed as affecting a pre-inquiry willingness to inquire as well as motivation to continue.

But willingness to inquire is not enough. Specific learning of what constitutes a discrepancy for any particular field of inquiry must also be present. Thus three ingredients combine to form the prerequisites for the event called problem sensing. Two of these prerequisites are in the learner and one in the situation. The situation may be diagramed as in Figure 4.

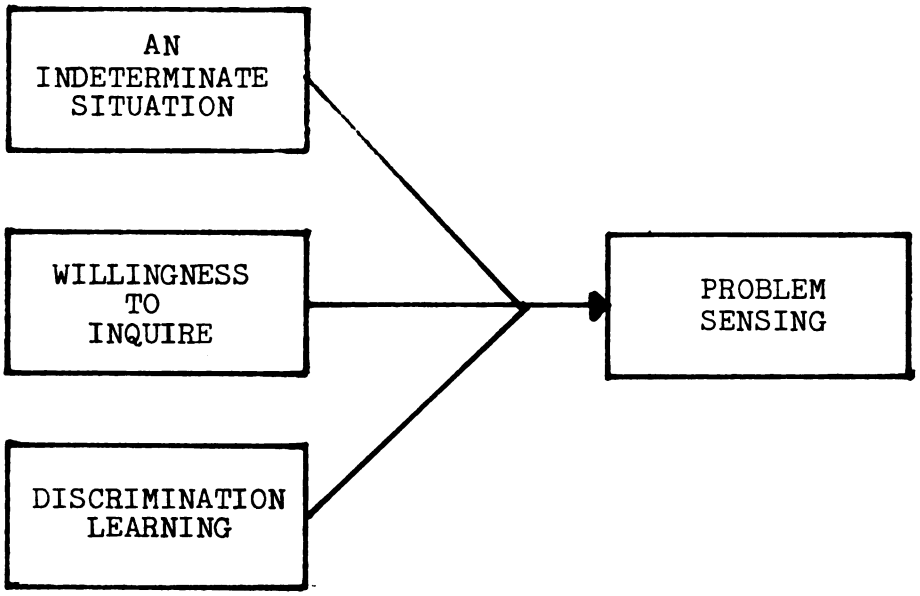


FIGURE 4

DIAGRAM SHOWING THE THREE PREREQUISITES
TO PROBLEM SENSING

Clearly, training in openness was able to affect only the willingness to inquire. On reflection this was not too surprising.

Implications for Education

Inquiry has been described by Dewey as a process which has certain formal characteristics which remain constant across situations. The four subprocesses listed above are one way of describing these formal characteristics. Their very generality is what gives them their power. But they are powerless indeed unless aided by specific learning. It would be interesting to see how specific learning interacts

with all phases of the inquiry process. This question is posed in Figure 5.

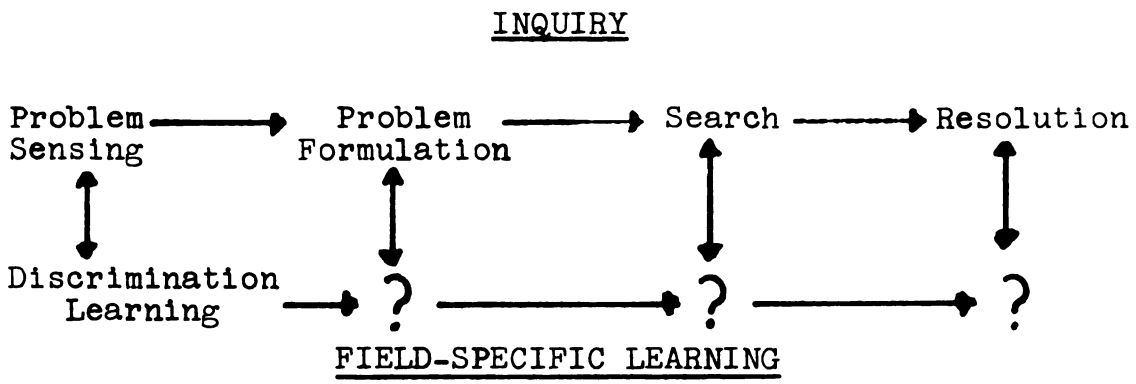


FIGURE 5

UNANSWERED QUESTIONS ABOUT INTERRELATIONS OF INQUIRY AND FIELD-SPECIFIC LEARNING

What are the implications of openness training for education. First it should be recognized that openness is not some esoteric concept completely foreign to the educational scene. It is a learned way of relating to one's world where "world" is interpreted to mean both self and other selves, internal events and external events. It sets the stage for effective inquiry to occur.

If this is true, and if we can learn what it is that opens people and what closes them up, then we can learn to manipulate the conditions so as to increase the probability of opening them up, increasing their willingness to inquire. The present study implies that at least this much can occur as a function of learning.

Implications for Research

The present study raised questions about the conditions under which seeking style can be expected to appear as a determiner of inquiry behavior. Conditions which were discussed included (a) academic aptitude, (b) extent of knowledge base, (c) extremity of position on the seeking style dimension, and (d) the presence or absence of training preceding the inquiry session. These four conditions are all variables which could and should be manipulated.

A second area of possible research involves the training of openness. Would the training of openness have been more powerful if it had lasted longer? Which is the more powerful technique for teaching openness, verbal reinforcement or the induction of inconsistency? Would the model of openness have been more effective if it had been more focused instead of being so general and diffuse? These are all questions which could be studied in further research.

A third area of research was referred to earlier, that of investigating the factorial complexity of two areas of the present study: (a) seeking style as defined by the selection battery and (b) inquiry behavior itself as defined by the in-basket variables. The correlations reveal that in both cases there is much dependence of one measure on another. It would be of great value to theory to ascertain just how many factors are present.

Finally, it would be well to try to ascertain the kind

of specific knowledge base that underlies each of the four subprocesses of inquiry. Learned discriminations have already been identified as underlying problem sensing. What might underlie the other three subprocesses?

This last question is one which can be investigated empirically. If it were, what might one expect to find? Perhaps a few speculations are in order.

Dewey (1938) assumed that problem formulation was a kind of generalized strategy which could be applied across a variety of situations. It was a matter of juxtaposing the discrepant elements in a manner that would guide the search for further information and anticipate the form of the solution. Dewey insisted that a problem well formulated is a problem half solved.

What kind of specific knowledge base might be expected to underlie problem formulation? Most likely the base contains two elements: (a) a knowledge of the elements (concepts) appropriate to the specific field and (b) a knowledge of how to combine those elements in valid and meaningful ways. In other words, the person who is most adept at forming lawful "if . . . then" statements will be the person who is most adept at formulating problems.

The knowledge base underlying the search process is likely to be of less crucial importance than the knowledge base underlying problem sensing and problem formulation. The reason is that if the problem has been well formulated, the area for search will have been greatly delimited. The

knowledge base is simply a knowledge about sources of information relevant to the problem-as-formulated.

It is difficult to say whether there is such a thing as a knowledge base underlying the process of problem resolution. If there is, it would not likely be much different from that which underlies problem formulation. A problem resolution is in a unique position in that it reaches back for support in established knowledge but at the same time reaches out to the unknown. It is to be judged not only in terms of its consistency with past knowledge but also in terms of its consequences. Thus, underlying problem resolution lie not only issues of knowledge but also issues of value.

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APPENDIX A

Appendix A contains the scoring key for competence.

COMPETENCE SCORING KEY

Cooper

1. Gathers information but makes no attempt to treat problems.

2. Deals with birthday and/or Friday problems administratively and/or in terms of some solution which ignores Cooper's social alienation and its presumed causes.

3. Deals with birthday and/or Friday problems in terms of Cooper's social alienation.

4. Deals with all symptoms (birthday, Fridays, dropping grades, isolation, low feeling of belonging, inability to work independently) in terms of some unified approach which treats underlying causes (tomboy behavior, age, rural orientation, appearance).

Fagen

1. Gathers information but makes no attempt to treat problems.

2. Relates symptoms (does not bring assignments in, fights with his own friend, ignores his step-sister, gets poor grades, low achievement, poor deportment, absent and tardy) to one of the underlying problems (low ability, step-father, new town, new school, capable and popular step-sister in same class, small in comparison with peers).

3. Relates symptoms to at least two underlying problems.

4. Relates symptoms to at least three underlying problems.

Hoffman

1. Poor RC, low CTP, isolate

2. Grades discrepant with IQ, underachiever, drop in grades, chooses popular kids.

3. Emotional problems, sister coming, poems vs. grades, problem chronic and getting worse, stuttering.

4. Comparing Jane with Shirley, pressure relation between Jane and parents, no best friend.

5. Sister is a star - cannot compete, home pressure getting worse because of sister's visit, reaction formation (stuttering is unconscious rebellion).

Lopez

1. Identifies problems (low RC, low cardex, low CTP, almost isolate, migrant) but proposes no solutions.

2. Identifies problems (oldest in class, dyad, transfer student, absent and tardy, underachiever) but draws no conclusions.

3. Explains problems in terms of cliches or the obvious (slow learner, emotional problems, low motivation, social problem, needs academic help, frustration and blocking, needs extra help, dislikes school).

4. Explains problems in terms of factors which are known to be related to the kinds of symptoms presented (language, culture, parents with low education cannot help, emphasis in migrant community on physical survival, high incidence of absences, frequent moves, poor entry skills, large family but small house, social skills, social discrimination, early maturation, lower class kid in middle class school).

Lyons

1. Borderline CTP, isolate.

2. Older, bigger than most.

3. Twin brother, cleft palate, repeated 4th grade, low feeling of belonging, withdrawal tendencies.

4. Possible speech problem, emotional problem due to brother ahead, possible physical deformity.

Maloney

1. Treats Maloney but makes no attempt to tie anything up.

2. Treats Maloney but takes administrative approach (change seating arrangement, separate boys and girls in P.E.), restates problem without adding anything new, or diagnoses in terms of cliches (feelings of inferiority, emotional problem, cry baby, does not feel part of group, trouble communicating, nothing really wrong, does not know what is wrong).

3. Makes effective approach in terms of specific and known relationships between variables (overweight impedes performance in P.E.; overweight may have a non-physical basis and may need psychiatric attention; overweight may have a physical basis and requires medical attention; assumes that overweight, if it has a physical basis, is either being ignored by physician-father or if under treatment, is not yielding to treatment; recognizes relationships between social problems such as isolation, not working and playing well with others, low CTP, teasing, all these and overweight; need to find some way to help her lose weight).

Moore

1. Aware of math problem but makes no prescription; unaware of band-math conflict.

2. Aware of math problem and makes a prescription; unaware of band-math conflict.

3. Aware of band-math conflict but makes no prescription.

4. Aware of band-math conflict and prescribes for that immediate problem.

5. Aware of band-math conflict; makes prescription which accounts both for immediate band problem as well as long-term math problem.

Rosen

1. Gets facts about his brilliance but makes no recommendations.

2. Prescribes extra work.

3. Prescribes more challenging work or enrichment.

Sieminsky

1. Low RC, absent for CTP, no field trip slip in, popular, bruises, hit Hickman.

2. Behavior problem, disrupts class, very tall and skinny, teased Maloney, father changes jobs often.

3. Unstable family, father deserted and returned, aggressive yet popular, bruise research.

4. Comparisons between parents' jobs and education, home problems in relation to RC and good art grades.

5. Parents incompatible, father aggressive with Stu, Stu identifies with mother, fears father, beaten by father and/or mother, grades better during father's absence.

Fagen-Moore

1. Either one because other is not seen; cross burned; Nigger-lover.

2. Two Williams

3. Calls in to get answer.

Note: In each case the score for any problem is the level reached as indicated by the accompanying numbers. In the cases of Cooper, Lopez, and Maloney the score extended up to a maximum of five depending on how many of the highest level solutions were proposed.

APPENDIX B

Appendix B contains the tests composing the selection battery.

INVENTORY OF BELIEFS

Form T

This inventory consists of 100 statements which range over a wide variety of topics. As you read each statement you are asked to indicate quickly your agreement or disagreement with it in terms of the key given at the top of each page. People have different reactions to these statements. This is not a test in which there are "right" and "wrong" answers. What is wanted here is your own quick personal reaction. You should be able to finish taking the inventory in 20 minutes or less.

In responding to these statements you will notice that there is no way provided for indicating a neutral position. It is desired that you indicate a tendency toward either agreement or disagreement even though you may prefer to remain undecided. It is important that you respond to every one of the 100 statements.

When the proctor gives the signal, open your examination booklet and begin work. The key you are to use is reproduced at the top of each page. Note that you will never use the E response on your answer sheet.

KEY: A. I strongly agree or accept the statement.
B. I tend to agree or accept the statement.
C. I tend to disagree or reject the statement.
D. I strongly disagree or reject the statement.

1. Literature should not question the basic moral concepts of society.

2. The main thing about good music is lovely melody.

3. Lowering tariffs to admit more foreign goods into this country tends to raise our standard of living.

4. When things seem black, a person should not complain, for it may be God's will.

5. Science is infringing upon religion when it attempts to delve into the origin of life itself.

6. Literature which questions the basic moral concepts of our society is good.

7. In our present society only a wartime economy can provide full employment.

8. A man's conscience is an unreliable guide to right and wrong.

9. No task is too great or too difficult when we know that God is on our side.

10. A work of art which provides only entertainment is useless.

11. A person gets what's coming to him in this life if he doesn't believe in God.

12. Young people today are in general more immoral and irresponsible than young people of previous generations.

13. More playgrounds and fewer strict fathers would eliminate juvenile delinquency.

14. The many different kinds of children in school these days force teachers to make a lot of rules and regulations so that things will run smoothly.

15. Organized labor has done more to further economic progress than business and industry.

16. Poverty can be eliminated.

KEY: A. I strongly agree or accept the statement.
B. I tend to agree or accept the statement.
C. I tend to disagree or reject the statement.
D. I strongly disagree or reject the statement.

17. Europeans criticize the United States for its materialism but such criticism is only to cover up their realization that American culture is far superior to their own.

18. The worst danger to real Americanism during the last 50 years has come from foreign ideas and agitators.

19. The scientist that really counts is the one who turns theories into practical use.

20. There is only one real standard in judging a novel or play--that is convey a message of social significance.

21. Nudist colonies are a threat to the moral life of a nation.

22. Allowing more immigrants of all kinds into this country will improve our culture.

23. No world organization should have the right to tell Americans what they can or cannot do.

24. Despite the material advantages of today, family life now is not as wholesome as it used to be.

25. Raising our standard of living requires government regulation of business enterprise.

26. The United States doesn't have to depend on the rest of the world in order to be strong and self-sufficient.

27. Foreigners usually have peculiar and annoying habits.

28. The best assurance of peace is for the United States to have the strongest army, navy, and air force, as well as the most atom bombs.

29. It is only natural and right for each person to think that his family is better than any other.

30. Any man can find a job if he really wants to work.

31. Strikes are caused by the unwillingness of an employer to meet the needs of his employees.

32. American films emphasize sex more than foreign films do.

KEY: A. I strongly agree or accept the statement.
B. I tend to agree or accept the statement.
C. I tend to disagree or reject the statement.
D. I strongly disagree or reject the statement.

33. Being a successful wife and mother is more a matter of instinct than of training.

34. The only way to eliminate prejudice is through forceful legislation.

35. A person often has to get mad in order to push others into action.

36. There is only one real standard in judging art works--each to his own taste.

37. Business enterprise, free from government interference, has given us our high standard of living.

38. There is no art for art's sake.

39. The existence of poverty is an infallible sign of a poorly organized society.

40. Many social problems would be solved if we did not have so many immoral and inferior people.

41. Picket lines ought to be respected and never crossed.

42. You can't do business on friendship: profits are profits, and good intentions are not evidence in a court of law.

43. A person has troubles of his own; he can't afford to worry about other people.

44. Books and movies should start dealing with entertaining or uplifting themes instead of the present unpleasant, immoral, or tragic ones.

45. The minds of many youth are being poisoned by bad books.

46. Speak softly, but carry a big stick.

47. Military service should be by choice rather than by conscription.

48. Peace can only be achieved when the United States abandons its attempt to establish military superiority.

49. Honesty, hard work, and trust in God ensure neither material nor spiritual rewards.

KEY: A. I strongly agree or accept the statement.
B. I tend to agree or accept the statement.
C. I tend to disagree or reject the statement.
D. I strongly disagree or reject the statement.

50. Ministers in churches should not preach about economic and political problems.

51. Each man is on his own in life and must determine his own destiny.

52. The moral good or evil of people has little bearing on any possible destruction of the world.

53. The successful merchant can't allow sentiment to affect his business decisions.

54. No intelligent man today can really believe in God.

55. The United States should make no attempt to exercise control over any world organization.

56. Ministers who preach socialistic ideas are a disgrace to the church.

57. Labor unions don't appreciate all the advantages which business and industries have given them.

58. We should impose a strong censorship on the morality of books and movies.

59. European criticism of the United States is quite justified.

60. If we allow more immigrants into this country, we will lower our standard of culture.

61. Modern paintings look like something dreamed up in a horrible nightmare.

62. The greatest contribution to real Americanism during the last 50 years has come from the intermingling of foreign immigrants and native-born.

63. What a person gets in this life has little to do with whether he believes in God or not.

64. Voting determines whether or not a country is democratic.

65. In our society, a person's first duty is to protect from harm himself and those dear to him.

66. Europeans have no faults as bad as the provincial smugness and intolerance of Americans.

KEY: A. I strongly agree or accept the statement.
B. I tend to agree or accept the statement.
C. I tend to disagree or reject the statement.
D. I strongly disagree or reject the statement.

67. Members of so-called racial minorities are no more alike than any other group of American citizens.

68. A belief in divine guidance is of little help in meeting difficulties.

69. Those who can, do; those who can't, teach.

70. Philosphers on the whole act as if they were superior to ordinary people.

71. We would be better off if people would talk less and work more.

72. Most intellectuals would be lost if they had to make a living in the realistic world of business.

73. Science will eventually explain the origin of life.

74. A lot of teachers, these days, have radical ideas which need to be carefully watched.

75. Now that America is the leading country in the world, it's only natural that other countries should try to be like us.

76. Prayer does little toward relieving one's problems.

77. Capital punishment does not serve to lower the crime rate.

78. Foreign films emphasize sex more than American films do.

79. Our rising divorce rate is a sign that we should return to the values which our grandparents held.

80. Pride in craftsmanship and in doing an honest day's work is a rare thing these days.

81. The United States may not have had much experience in international dealings, but it is the only nation to which the world can turn for leadership.

82. A sexual pervert is an insult to humanity and should be punished severely.

83. Labor, since it represents the majority, should be given a greater voice in a democracy than capital.

KEY: A. I strongly agree or accept the statement.
B. I tend to agree or accept the statement.
C. I tend to disagree or reject the statement.
D. I strongly disagree or reject the statement.

84. The actions of the United States in world politics clearly demonstrate its unfitness for world leadership.

85. Both beauty and purpose can be found in all modern paintings.

86. There may be a few exceptions, but, in general, members of a racial group tend to be pretty much alike.

87. There are too many people in this world who do nothing but think about the opposite sex.

88. Modern people are superficial and tend to lack the finer qualities of man-hood and womanhood.

89. It is more important for a book or movie to be realistic than to be pleasant.

90. Members of religious sects who refuse to salute the flag should be punished for their lact of patriotism.

91. As young people grow up, they ought to get over their radical ideas.

92. The twentieth century has not had leaders with the vision and capacity of the founders of this country.

93. Books on tragic and sordid themes help youth to face the world of reality.

94. There are a lot of things in this world that will never be explained by science.

95. The world will get so bad that some of these times God will destroy it.

96. Other countries don't appreciate as much as they should all the help that America has given them.

97. It a person is honest, works hard, and trusts God, he will reap material as well as spiritual rewards.

98. The welfare of others is more important than one's own self-interests.

99. Nothing but profit to our country would result from the relaxation of our present strict immigration laws.

KEY: A. I strongly agree or accept the statement.
B. I tend to agree or accept the statement.
C. I tend to disagree or reject the statement.
D. I strongly disagree or reject the statement.

100. No censorship on the presumed morality of books and movies can be justified.

WORD ASSOCIATION

Listed below are twenty-five words that have more than one meaning. In the space following each word, you should write down as many of the meanings as you can. The meanings need not be written out in full; writing down one word will usually do. For example:

BARK tree, dog, seal, boat

These four words bring to mind three different meanings for the word BARK: the outer covering of a tree; a certain noise made by some animals like dogs and seals; and a kind of boat. Notice that the meanings were not written out in full; only some words to remind us of these meanings were given. This is all you have to do.

Your score will depend both on the number of different words you write (in the example above this was four) and on the number of different meanings the words remind us of (in the example above this was three). So if you had time to write only two words for BARK, you would choose tree and dog, say, rather than dog and seal because the former words stand for one meaning.

When you are sure of what you are to do, you may begin.

1. ARM _____

2. BIT _____

3. BOLT _____

4. CAP _____

5. COIL _____

6. DUCK _____

7. FAIR _____

8. FAST _____

9. FILE _____

10. GRAVE _____

11. HOST _____

12. LEAF _____

13. MORTAR _____

14. PINK _____

15. PITCH _____

16. PLANE _____

17. POKE _____

18. POLICY _____

19. PORT _____

20. PUNCH _____

21. RAKE _____

22. SACK _____

23. STRAND _____

24. TACK _____

25. TENDER _____

POLITICAL POSITION

1. To the best of your knowledge, what are (were) the predominant political leanings of your parents? Please circle the letter corresponding to your answer.

a. Democractic
b. Republican
c. Independent
d. Other (specify)_____

2. Politically speaking, would you consider yourself: (circle)

a. Quite conservative
b. Somewhat conservative
c. Middle-of-the-road
d. Somewhat liberal
e. Quite liberal

3. Presidential preference

a. For this item, think back to last November, election eve. Rank the following four people according to your preference assuming that they were all eligible candidates for the presidency. Rank them as you would have preferred them on that night regardless of whether or not they actually were nominated by their parties or were elected. Rank the most preferred as number one, etc.

1) Ronald Reagan ____
2) Richard Nixon ____
3) Hubert Humphrey ____
4) Ted Kennedy ____

b. Were the election held today, what would be your preference? Rank the most preferred as number one, etc.

1) Ronald Reagan ____
2) Richard Nixon ____
3) Hubert Humphrey ____
4) Ted Kennedy ____

ATTITUDE INVENTORY

This questionnaire is composed of 30 statements with which you will be asked to agree or disagree. For each statement, respond according to the following key:

(1) True

(2) False

Please proceed through the inventory quickly, and respond to every item.

1. I like to have a place for everything and everything in its place.
2. Some of my friends think that my ideas are impractical, if not a bit wild.
3. I don't like to undertake any project unless I have a pretty good idea how it will turn out.
4. For most questions there is just one right answer, once a person is able to get all the facts.
5. Politically I am probably something of a radical.
6. Perfect balance is the essence of all good composition.
7. I prefer to engage in activities from which I can see definite results rather than those from which no tangible or objective results are apparent.
8. I find that a well-ordered mode of life with regular hours is not congenial to my temperament.
9. The unfinished and the imperfect often have greater appeal for me than the completed and the polished.
10. I like to listen to primitive music.
11. I have always had goals and ambitions that were impractical or that seemed impossible for me to realize.
12. When a teacher lectures on something other than what he originally announced, I feel uneasy.
13. Trends toward abstractionism and the distortion of reality have corrupted much art of recent years.
14. It bothers me to have different news commentators give different interpretations of the news.

15. I like to fool around with new ideas, even if they turn out later to have been a total waste of time.

16. I don't like to work on a problem unless there is a possibility of coming out with a clear-cut unambiguous answer.

17. I have always hated regulations.

18. Many of my friends would probably be considered unconventional by other people.

19. It doesn't bother me when things are uncertain and unpredictable.

20. My way of doing things is apt to be misunderstood by others.

21. Facts appeal to me more than ideas.

22. I have had strange and peculiar thoughts.

23. I don't like things to be uncertain and unpredictable.

24. The worst thing an instructor can do is to make very specific plans for each lesson.

25. It is a good rule to accept nothing as certain or proved.

26. I dislike following a set schedule.

27. Usually, I prefer known ways of doing things rather than trying out new ways.

28. I like to go along to visit new and strange places.

29. I much prefer friends who are pleasant to have around to those who are always involved in some difficult problem.

30. I have had very peculiar and strange experiences.

APPENDIX C

Appendix C contains samples of materials used in openness training.

OBJECTIVES

1. To develop a model of the open person, i.e., to describe the qualities which are characteristic of the open person.

2. To practice using the model of the open person in a variety of real-life situations.

3. To check our degree of mastery of the model through comparing our performance on a test of openness with the performance of a sample of persons judged to be extremely open.

4. To give some consideration to where each of us currently stands in relation to the criterion of openness.

AN OPEN UNDERGRADUATE

You can probably look back and recall a person who was influential in shaping your behavior, who, because of certain qualities, served as a model for you, whose mannerisms you found yourself mimicing, whose speech inflections you began to copy. I have a friend, Paul, who was that kind of person. He entered the university with me as a freshman. We were assigned to the same suite so I had, as you can imagine, time to observe him and to talk with him. In the pages that follow I want to share with you some of the things I observed in Paul so that in reading about him you might gain some of the same benefits that I gained from living with him and getting to know him intimately.

One thing we must get straight from the beginning. Paul was no intellectual genius. On the contrary he had an IQ which fell somewhere around the middle of our entering class. I would have to assume, therefore, that the success he experienced was mostly unrelated to intelligence, that it was due largely to some learned habits, or personality style, or what have you. I guess what I really want to do is to tell you about his style.

In this university as in most, it was the custom to give all entering freshmen a whole battery of aptitude tests. It was also the custom to release the results to the students as soon as they were evaluated. You can imagine, therefore, what many roommates did following release of the results. They shared and compared scores. Paul was no exception. He openly and unilaterally told me how he had done. He said he showed a rather even pattern of aptitude across biological and physical sciences, math, humanities, and social sciences. Nothing exceptional, understand, but respectable. This all rather embarrassed me because I knew that the next question would be, "How'd you do?", and I didn't want to tell him. At that time I was somewhat less than confident of myself and didn't want to expose myself to public view. It wasn't that I had done badly. I was actually slightly higher than Paul in math and physical and biological sciences though considerably lower in humanities and social sciences. The feared question did come. How had I done? I knew this wasn't a good way to begin life in the room together but I managed to get out in some bumbling embarrassed way that I didn't want to tell him how I did. I expected to get a negative reaction but it never came. He just said, "OK". I appreciated that. He was willing to let me do what I wanted without making demands in return. He didn't try to override my wishes. I might add that my refusal to share with him didn't affect his behavior with me one whit. He continued to share openly with me about all sorts of things; his love affairs, impulses, fantasies, anxieties and conflicts, academic progress, ad infinitum. The way he opened himself to me and most other

people almost amounted to a declaration of confidence in himself. I often reflected on this. He reminded me of James Weldon Johnson's interpretation of a poem in the Bible where the Hebrew poet ended each verse with the words "And God saw what he had made and said 'That's good'". Paul was like that. He felt he was good and he felt the world was good. It was only later when I had switched from chemistry to education that I was able to verbalize this. I know now that all unconsciously, Paul had grown up largely in the Hebrew philosophical framework, believing in the goodness of life. I in turn had grown up all unconsciously, under Greek influence believing that flesh is bad, that only spirit is good. (Now, of course, the Greek influence is forgotten and they call it Puritanism). Anyway, Paul presented an enigma for me. Contrary to his open acceptance of his emotions, impulses, and what not, I repressed all mine. I suffered unexpressible mental torture over thoughts that shouldn't come to mind, over unacceptable impulses that forced their way into consciousness. It was only through living with him and modeling him that I grew to the point where I now find myself experiencing a larger degree of freedom and openness.

I must go on to tell you something about the university program because Paul's and my reactions to it will give you some further insight into our contrasting styles. The program was about as unstructured as you can imagine. You were to choose your area of specialization from five broad areas, from that point on the options were rather broad. Paul chose social science and I chose physical science. The courses you took within your area were pretty much a matter of your choice. Whether or not you chose to go to class was your own business. Assignments as we normally think of them were nonexistent. Each student chose his own way to the goal. The university's part was limited to providing learning aids and to administering comprehensive exams at the year's end. It was strictly up to each student to organize his schedule so as to pass comps. You could TGIF every day if you wanted and no one would say a thing. If I tell you that the system scared the hell out of me then you should automatically be able to guess Paul's reaction to it. He thrived on it. He set up a general schedule but was extremely flexible in following it. His interests were varied. He was forever going new places, exploring new areas, getting involved in extracurricular activities. As a result he developed a broad and varied circle of friends.

One of his chief side interests came to be painting. He did a good job of it too. One of the things which impressed me about his painting was that you felt he had really "grasped" his subject in its full richness and detail.

His painting in a sense gave a clue to his whole orientation toward the environment. He was alive to everything around him. It was as though he had sense organs all around

him and that he "reached out" and took in all the details that most people miss. He not only took it in but seemed to enjoy it all thoroughly. He was what I would call "alive" to the environment.

His relationships with people seemed to demonstrate the same absorbing interest. I always felt when talking with him that I had his full attention. He never made me feel by blank stares, or by looking past me, or by shuffling papers and feet that he wasn't listening or that he would rather be doing something else. On the contrary, if he did want to do something else or if he did have something else on his mind he would say so. Sometimes his frankness bothered me but I now consider it a matter of courtesy. As a result of his interest in interacting with people, he was able to recall details of conversations months later. I am convinced that this was not a "public relations" trick which he cultivated assiduously but was rather a natural result of his sincere interest in people.

I may be giving the impression that Paul was too "nice". It may be that I'm exaggerating. I doubt it though. People like him come one in a hundred. Be that as it may, I shall try to fill out the picture. I have already said that Paul accepted his impulses and acted on them. This was as true of anger and aggression as it was of affiliation and friendship. He was fiercely defensive of his autonomy and independence. He permitted neither parent nor president to step on these without retaliation. He did not usually go around punching noses but he was not averse to using tongue and pen. (Thanks to Dr. Freud we now have a name for that; sublimation, I believe). He seemed to view authority figures as over-protective or over-possessive. Thus as you see he was not "nice" so much as he was realistic and honest. He kept his impulses, his values, and his perception of reality in delicate but stable balance.

One of the side benefits of this way of responding to the unstructured university world was a low level of anxiety and conflict. He probably would have preferred some anxiety in this situation to no anxiety in a completely structured one. His fear of the impending comprehensives was at a reasonable level.

You could count on me as having reacted in a very different way to this unstructured environment. There were times when I would have dropped out of school if it had not been for Paul's encouragement. My anxiety level was very high at times. I wanted my advisor to tell me what to do but he refused. He would only give me some very general guide-lines. My concern was so high that I am sure I was relatively closed up to much of the environment around me. I could only think of comps. I didn't make a lot of friends and the ones I made served more as supports for my needs than as true friends in a give and take relationship.

You can easily see that to begin with at least, Paul and I were quite different. This basic difference carried over into our approach to failure. Things that would have practically destroyed me only gave Paul a brief halt. Once he was deeply infatuated with a real beauty on campus. He had committed himself to her heart and soul and had finally pinned her. The night she took his pin he returned to the dorm his usual expressive, dramatizing self only more so. At this point one might have called him exhibitionistic. He danced, he sang, he even demonstrated with my pillow how he had embraced her after she took the pin and how he was going to greet her the next night. The next night she returned the pin and he came straight back to the dorm. He was crushed. His pain and disappointment were as obvious then as his elation had been the night before. In spite of that, a week later he was beginning to date someone else. I have followed him since and have learned that this ability to pick up and start over again following failure is typical of him.

The two of us found out quickly that we differed in political persuasion, he being a Republican and I a Democrat. In discussions of political issues I was always at a disadvantage. I couldn't resist his arguments. I couldn't have told you then why it was but I know now. It was because he knew as much about my position as he knew about his own. I, in turn, was only poorly acquainted with my position and not at all familiar with his. He knew equally well exactly in what sense the positions were different. Further, he was well informed about socialism, communism, as well as other political systems. Yet, though he blew me off the field in argumentation and though he disagreed fervently with me on the major issues, he never made agreement with him a condition of friendship.

He had another admirable quality. He was flexible. He adapted easily to new information. His position was constantly being updated and fortified by new imputs. He seemed to be aware of the fact then that I have only been coming to realize recently, that life is a process, going on but never arriving. To tell the truth, I think he preferred it that way.

There is only one other thing I want to tell you about Paul. That is that he was especially given to defending the part of the underdog. There was a time when the university administration was using all its influence to get the road commission to build a new freeway directly between campus and an encroaching ghetto. This was directly contrary to Paul's idea of what should be done. He felt that the university should make a concerted effort to aid the ghetto people in attempts to improve the area. He appeared at an open commission meeting to oppose university policy. He also wrote articles for the campus paper in behalf of his ideas.

His idealism has led him into many such activities. This is consistent with an early predisposition. In our freshman year he expressed a vocational preference that would involve him primarily in work involving direct contact with people. Today he is working effectively as a social worker.

I started out by saying that Paul had a particular style. Let's name it openness. You can see that it has many ways of expressing itself in behavior. Some would say that this open behavior is due to some underlying personality variable. Others would say that it is simply an integrated system of habits. Call it what you want, I find it to be very very effective. I have learned a more open style and find that it has provided a number of benefits. See if you can guess what they are.

MODEL OF OPENNESS

What kinds of behavior characterize the open person? What is he like? Here, as is often the case in such matters, it is convenient to "divide" the person into his private self and his public self. We wish to discuss both the person as he is inside the boundaries provided by his skin as well as the person in his relation to the world of external objects. The picture given here is a composite of models offered by Schachtel; Stern, Stein, and Bloom; Rokeach; Combs and Maslow.

First, then, what is the open person like "inside"? One thing that each person has to do is to come to terms with, to develop some mode of response to, the biological impulses with which he is genetically endowed, such as sex, affiliation, hunger, etc. The open person's characeristic response is to accept his impulses as good and act on them. He allows them expression either directly or in sublimated form through, for example, poetry, painting, music. But he does not allow his impulses to predominate. Rather he keeps them in balance with the demands of reality and with the demands of his value system. It is in this sense that he is a balanced person.

The open person has a strong sense of self, as being one distinct and separate from the environment. He engages in introspection and self-appraisal. His view of himself tends to be positive and accurate. He can see himself objectively as others see him. He likes himself, sees himself as worthy, as adequate, as wanted, as being identified with others. Since he has nothing he wants to hide he tends to be self-revealing, self-dramatizing. He allows others to see himself as he is.

The open person is more likely to be free of personality pathology. He will suffer, as do all of us, from anxiety but his anxiety will tend to be more focused. He can therefore more easily verbalize it, label it, and thus work towards its dissipation. His conflicts are likewise conscious and verbalized. He is less likely to need psychiatric counseling but if he needs it he will go get it rather than pretend that nothing is wrong.

He will occasionally fail in an undertaking but if he does he has the capacity to pick up and start over again. He is adept at overcoming personal weakness. His behavior is plastic and flexible. He can easily adapt to changed circumstances. He is capable of sustained effort for remote goals.

The open person has an entirely internalized value system. Thus he does not go around quoting authorities such as "mama says" or "my pastor says" but says, rather, "I believe".

So much for what we might call the open person's personality system. Let us talk now about his cognitive belief system. Let us think of this system as that mass of data which makes up the person's view of the world. How is it organized? One principle of organization which applies here is "integration". All the bits of data are integrated, that is, are related logically and harmonically with one another and with the higher order primitive organizing principles. These data are in communication with one another rather than being organized into non-communicating compartments as, for instance, one compartment for science and another for religion. This means that new information inputs are free to affect the total cognitive organization and appropriate adjustments can thus be made. In short, the open person is highly adaptive.

We can also think of any person's cognitive system as containing some disbelief sub-systems, that is, some things he does not believe. For instance, if he believes the Republican political philosophy, he probably disbelieves the Democratic, the Socialistic, and other political philosophies. What characterizes the relation between the open person's belief and disbelief systems is the high degree of differentiation between and among belief and disbelief systems. In plain English, he knows quite clearly how what he believes in differs from what he disbelieves. Furthermore, it means that he is about as well versed in what he disbelieves as he is in what he believes. If he is Christian, he is well acquainted with the details of Christian theology and history but he is also well acquainted with Judaism, Mohammedanism, etc. While he believes in, and is committed to, a particular belief system, he is highly accepting of people who are committed to systems different from his own.

A second question with which we wanted to deal was that of the way the open person relates to the world of external objects. The most general statement we could make is that he is characterized by an intense interest in his environment, a turning toward the environment which is noteworthy for its totality and its affirmativeness.

Some people see things out there principally as objects of use, objects to gratify one's needs. Not so the open person. He is more interested in the object as a thing in inself. He notices the richness of the qualities of the object. This kind of approach to the object, whether it be a person or some inanimate thing, is absolutely indispensable for painter and poet. In fact, among painters and poets and other such persons we are likely to encounter some of the world's most open people.

So much for the open person's relation to the environment in general. The relation to which we now turn is the relation

between the open person and other persons. We find that he places great importance on interpersonal relationships. Since he operates from the base of a secure self he is able to and predominantly interested in carrying on transactions with other people. Given that he does value himself and since in general he feels free to express impulse and emotion, he expresses aggression freely against any who threaten his autonomy and independence. This applies largely to authority figures whom he sees realistically, frequently as over-protective and over-possessive. He is likely to express ambivalence toward parents. Nevertheless, he generally maintains good contact and rapport with others. He is sensitive to and concerned with how things seem to others and he uses this as a basis for his own behavior. He sees other people generally as friendly, enhancing, and worthy, as possessing integrity and dignity, as dependable, as potentially fulfilling and enhancing of self. He identifies with the underdog. He has a capacity for dramatic, idealistic social action.

Finally, there seem to be a few characteristics of the open person which do not fit neatly into the two point organization of this resume. One is the fact that he seems to get along comfortably with, and maybe even prefers, ambiguity. He doubts pat answers to complex issues. He sees life as a process of becoming rather than as the achievement of a settled state. He sees the world as a friendly place. He looks forward to the future as exciting and full of wonderful possibilities. He feels adequate to cope with life. He is less likely than the closed person to lose himself in the "one great true cause" in hopes of bolstering up a faltering ego. He seeks friendships with people with varying points of view. He relies on rational authority. He rejects so-called absolute authorities of all types including books, persons, and institutions. He resists "partyline" changes in belief. He relies on his own perception of the facts to tell him where truth lies.

STERN, STEIN AND BLOOM

The open person seemed to be represented by:

1. Highly personalized and individualized social relationships
2. Pervasive rejection of authority figures
3. Spontaneous and acceptant impulse life
4. Non-conforming flexibility in behavior

ROGERS

A major observation is that the individual moves toward being open to his experience. This is a phrase which has come to have increasingly definite meaning for me. It is the polar opposite of defensiveness. Defensiveness I have described in the past as being the organism's response to experiences which are perceived or anticipated as incongruent with the structure of the self. In order to maintain the self-structure, such experiences are given a distorted symbolization in awareness, which reduces the incongruity. Thus, the individual defends himself against any threat of alteration in the concept of self by not perceiving those meanings in his experience which contradict his present self-picture.

In the person who is open to his experience, however, every stimulus, whether orginating within the organism or in the environment, would be freely relayed through the nervous system without being distorted by a defensive mechanism. There would be no need of the mechanism of "subception" whereby the organism is forewarned of any experience threatening to the self. On the contrary, whether the stimulus was the impact of a configuration of form, color or sound in the environment on the sensory nerves, or a memory trace from the past, or a visceral sensation of fear or pleasure or disgust, the person would be "living it," would have it completely available to awareness.

ROKEACH

The more open one's belief system, the more should evaluating and acting on information proceed independently on its own merits, in accord with the inner structural requirements of the situation. Also, the more open the belief system, the more should the person be governed in his actions by internal self-actualizing forces and the less by irrational

inner forces. Consequently, the more should he be able to resist pressures exerted by external sources to evaluate and to act in accord with their wishes. One important implication here is that the more open the person's belief system, the more strength should he have to resist externally imposed reinforcements, or rewards and punishments. These should be less effective as determinants of the way information will be evaluated and acted upon.

APPENDIX D

Appendix D contains ANOVA tables and a correlation matrix supplementary to data contained in the text.

TABLE D-1

THREE-WAY FACTORIAL ANALYSIS OF VARIANCE
OF DOGMATISM SCORES (N=60)

Source	df	MS	F	p
Treatments	2	684.65	.99	.38
Seeking Style	1	7684.02	11.12	.002
Cueing	1	132.02	.19	.66
T x S	2	97.12	.14	.87
T x C	2	763.72	1.11	.34
S x C	1	.15	.00	.99
T x S x C	2	23.45	.03	.97
Error	48	691.06		

TABLE D-2

THREE-WAY FACTORIAL ANALYSIS OF VARIANCE
OF PROBLEM SENSITIVITY SCORES

Source	df	MS	F	p
Treatments	2	49.65	.18	.83
Seeking Style	1	60.00	.22	.64
Cueing	1	38.40	.14	.71
T x S	2	256.55	.94	.40
T x C	2	1231.55	4.50	.02
S x C	1	3.27	.01	.91
T x S x C	2	125.32	.46	.64
Error	48	273.58		

TABLE D-3

THREE-WAY FACTORIAL ANALYSIS OF VARIANCE
OF GENERAL INQUIRY SCORES (N=60)

Source	df	MS	F	p
Treatments	2	433.02	.68	.51
Seeking Style	1	268.82	.42	.52
Cueing	1	104.02	.16	.69
T x S	2	202.12 22	.32	.73
T x C	2	2208.32	3.47	.04
S x C	1	74.82	.12	.73
T x S x C	2	77.02	.12	.89
Error	48	636.83		

TABLE D-4

THREE-WAY FACTORIAL ANALYSIS OF VARIANCE
OF SHIFTS/TIME SCORES (N=60)

Source	df	MS	F	p
Treatments	2	.08	.83	.44
Seeking Style	1	.06	.64	.43
Cueing	1	.04	.41	.53
T x S	2	.14	1.48	.24
T x C	2	.16	1.65	.20
S x C	1	.40	4.09	.05
T x S x C	2	.03	.32	.72
Error	48	.10		

TABLE D-5

COMPARISON OF OPENNESS GROUP VS.
CONTROL GROUP FOR TIME

Source	df	MS	F	p
Treatments	1	4243.60	3.88	.05
Seeking Style	1	828.82	.76	.39
Cueing	1	410.82	.38	.54
T x S	1	122.50	.11	.74
T x C	1	902.50	.82	.37
S x C	1	476.02	.43	.51
T x S x C	1	0.00	0.00	1.00
Error	48	1094.97		

TABLE D-6

COMPARISON OF OPENNESS GROUP VS.
CONTROL GROUP FOR BITS

Source	df	MS	F	p
Treatments	1	9765.63	3.80	.06
Seeking Style	1	660.02	.26	.61
Cueing	1	190.82	.07	.79
T x S	1	2512.23	.98	.33
T x C	1	4347.23	1.69	.20
S x C	1	2954.02	1.15	.29
T x S x C	1	4906.23	1.91	.17
Error	48	2572.91		

TABLE D-7

INTERCORRELATIONS AMONG ALL VARIABLES, N=60

GPA	1								
Beliefs	2	21							
Complexity	3	06	62						
Politics	4	02	58	29					
Word Association	5	22	37	36	20				
Dogmatism	6	-09	-59	-29	-38	00			
Dogmatism (Neg.)	7	06	52	24	39	-05	-96		
Dogmatism (Dev.)	8	-04	21	17	10	18	-31	18	
P.S. Steps	9	16	23	09	02	15	-38	40	19
P.S. Quality	10	29	09	18	14	06	-27	28	-06
Bits	11	-05	14	14	14	19	-07	10	-05
Time	12	-09	02	13	05	14	-08	14	-12
Total Sources	13	22	12	-04	00	35	-11	13	-14
Mean Sources	14	28	03	-10	-05	26	-06	06	-15
Shifts	15	-02	07	01	07	11	-06	08	-07
Problems	16	24	02	-04	-04	14	-07	05	-09
Competence	17	15	02	-02	-05	18	-12	11	00
Mean Competence	18	24	-04	-08	-13	13	-08	07	-09
M.S.U. Reading	19	53	26	14	04	40	-09	00	07
CQT Verbal	20	45	24	09	09	21	-10	07	-05
CQT Information	21	34	13	-01	08	18	16	-14	-26
CQT Numerical	22	33	06	-04	07	19	01	01	-18
CAT Total	23	49	20	-02	11	26	01	-01	-19
General Inquiry	24	24	07	-02	-04	26	-12	11	-09
Bits/Time	25	28	-01	-14	-04	-01	01	-08	05
Shifts/Time	26	06	15	06	14	05	-05	04	07
Problems/Time	27	06	04	08	05	-01	-02	00	-03
		1	2	3	4	5	6	7	8

TABLE D-7 (Continued)

1										
2										
3										
4										
5										
6										
7										
8										
9										
10	50									
11	31	16								
12	24	48	54							
13	36	39	65	53						
14	33	37	56	48	84					
15	31	24	90	47	75	68				
16	19	33	41	41	60	52	51			
17	28	39	21	35	39	29	33	63		
18	22	33	00	20	25	38	09	37	71	
19	-05	03	11	-02	25	26	06	36	27	32
20	09	00	09	-03	20	16	02	29	37	09
21	01	-02	06	-04	08	05	-06	22	13	10
22	06	16	07	-10	27	41	12	18	18	24
23	08	06	10	-07	25	28	04	31	14	18
24	33	45	51	52	79	66	64	89	81	54
25	-05	-10	-18	-56	-01	-04	-05	49	29	21
26	12	-23	55	-37	17	10	48	04	-11	-19
27	17	03	64	-12	48	42	79	32	17	-00
	9	10	11	12	13	14	15	16	17	18

20	73								
21	57	56							
22	39	23	36						
23	75	82	80	68					
24	35	22	17	25	28				
25	33	26	25	20	31	31			
26	12	10	11	11	14	04	36		
27	06	00	-04	18	07	39	35	81	
	19	20	21	22	23	24	25	26	27

APPENDIX E

Appendix E contains the complete raw data for all subjects.

TABLE E-1

Student Number	GPA	Inventory of Beliefs	Complexity	Politics	Word Association	Dogmatism Raw
1	296	55	07	12	121	138
2	257	57	13	10	086	105
3	280	45	10	05	102	124
4	205	51	11	16	092	127
5	220	58	22	16	104	107
6	250	62	11	12	105	102
7	212	60	09	12	079	136
8	245	50	18	09	100	140
9	200	68	24	12	107	096
10	230	56	09	17	095	097
11	220	69	15	14	108	093
12	372	60	18	13	102	138
13	254	64	12	08	085	105
14	201	51	13	12	093	157
15	202	64	17	13	095	138
16	290	83	24	18	140	120
17	299	60	16	15	138	088
18	210	56	15	12	102	136
19	374	71	19	18	119	083
20	326	56	10	15	096	110
21	372	67	09	17	125	133
22	220	65	17	13	118	081
23	167	51	13	08	113	122
24	350	49	07	13	104	120
25	220	73	15	17	117	093
26	170	40	09	15	106	139
27	250	53	24	12	090	151
28	237	66	16	13	117	111
29	333	56	15	12	101	151
30	226	58	14	06	090	138

TABLE E-1

Student Number	GPA	Inventory of Beliefs	Complexity	Politics	Word Association	Dogmatism Raw
31	343	62	20	12	151	164
32	198	58	14	15	114	154
33	220	36	15	08	104	178
34	210	52	18	13	113	153
35	256	64	19	14	151	174
36	247	67	23	17	117	148
37	256	75	21	17	126	121
38	245	80	29	16	130	101
39	333	73	16	14	104	068
40	345	68	20	10	133	133
41	214	48	07	13	100	172
42	278	64	21	15	104	097
43	315	50	10	14	094	144
44	310	50	18	09	092	125
45	300	50	12	05	111	136
46	341	79	27	15	113	128
47	194	54	09	18	104	157
48	220	54	15	12	092	144
49	233	48	06	12	114	152
50	280	66	15	12	125	131
51	289	55	12	12	092	141
52	230	72	15	17	118	105
53	305	80	21	18	123	060
54	225	56	21	13	118	115
55	293	42	09	09	123	177
56	231	70	17	14	112	114
57	333	61	11	11	100	148
58	240	79	20	16	124	121
59	260	44	13	04	145	161
60	250	71	25	17	124	086

TABLE E-2

Student Number	Problem Solving Bits	Problem Solving Competence	Bits	Time	Total Sources	Mean Sources	Shifts
1	13	0.4	201	141	82	8.2	156
2	05	0.2	138	157	53	5.3	095
3	09	0.3	189	146	65	6.5	142
4	06	0.4	280	167	64	7.1	227
5	02	0.3	171	128	46	4.6	087
6	04	0.2	103	115	44	5.5	072
7	11	0.3	131	086	37	3.7	085
8	07	0.5	152	169	47	5.2	085
9	07	0.4	190	126	46	5.1	130
10	05	0.3	162	156	43	4.3	108
11	10	0.4	161	120	46	5.1	102
12	10	0.5	156	124	46	7.7	083
13	14	0.5	153	116	52	6.5	121
14	12	0.4	274	150	49	4.9	209
15	05	0.5	158	151	55	5.5	120
16	08	0.2	227	133	56	5.1	121
17	15	0.4	126	096	52	5.8	081
18	11	0.2	207	097	44	4.4	141
19	22	1.1	150	172	49	4.9	096
20	15	0.7	180	110	55	6.8	159
21	04	0.6	168	116	71	6.5	129
22	07	0.5	191	131	68	6.8	159
23	17	0.6	272	153	69	6.3	209
24	07	0.7	242	106	74	7.4	207
25	13	0.3	298	168	79	7.4	245
26	09	0.5	235	173	71	7.1	157
27	07	0.4	184	100	51	6.4	134
28	19	0.5	257	160	74	8.2	214
29	03	0.1	132	099	44	4.4	069
30	14	0.3	190	113	55	5.0	114

TABLE E-2

Student Number	Problem Solving Bits	Problem Solving Competence	Bits	Time	Total Sources	Mean Sources	Shifts
31	09	0.5	258	173	69	7.7	169
32	06	0.4	093	124	43	5.4	060
33	11	0.4	126	121	40	4.4	077
34	04	0.3	128	087	38	4.2	071
35	02	0.0	133	080	42	4.2	072
36	06	0.6	200	112	53	4.8	154
37	06	0.4	179	123	56	5.6	103
38	12	0.3	275	149	59	5.9	197
39	11	0.3	133	068	41	4.1	055
40	17	0.5	256	156	79	7.9	226
41	02	0.2	130	091	38	4.8	092
42	06	0.3	131	085	40	3.6	076
43	11	0.5	168	111	62	6.2	160
44	04	0.4	233	134	60	6.0	178
45	06	0.3	163	111	48	6.0	101
46	06	0.6	237	147	69	6.3	182
47	07	0.1	260	152	49	6.1	153
48	08	0.1	151	091	43	3.9	082
49	06	0.3	146	106	59	5.4	099
50	13	0.4	247	179	85	7.7	220
51	10	0.4	142	092	57	5.2	094
52	06	0.1	230	104	62	6.2	181
53	22	0.4	227	105	56	5.6	106
54	08	0.8	217	141	63	5.7	114
55	11	0.4	239	152	57	5.7	140
56	10	0.5	141	139	49	5.4	086
57	08	0.4	177	150	64	6.4	108
58	09	0.3	167	124	54	5.4	103
59	09	0.3	137	104	63	6.3	099
60	20	1.0	191	171	76	6.9	146

TABLE E-3

Student Number	Problem Sensitivity	Competence	Mean Competence	Bits/ Time	Shifts/ Time	Problem Sensitivity/ Time
1	088	29	2.9	143	111	062
2	089	26	2.6	088	061	057
3	110	33	3.3	129	097	075
4	086	29	2.9	168	136	051
5	075	23	2.3	134	068	059
6	060	23	2.9	090	063	052
7	086	28	2.8	152	099	100
8	074	31	3.1	090	050	044
9	081	24	2.4	151	103	064
10	081	28	2.8	104	069	052
11	060	25	2.5	134	085	050
12	062	21	3.5	126	067	050
13	081	33	3.7	132	110	070
14	063	28	2.8	183	139	042
15	072	27	2.7	105	079	048
16	074	24	2.4	171	091	056
17	088	30	3.3	131	084	092
18	055	21	2.3	213	145	057
19	070	30	3.0	087	056	041
20	085	31	3.1	164	145	077
21	102	28	3.1	145	111	088
22	067	25	2.8	146	121	051
23	100	28	2.8	178	137	065
24	096	28	2.8	228	195	091
25	106	31	3.1	177	146	063
26	066	24	2.7	136	091	038
27	078	23	2.9	184	134	078
28	102	24	2.4	161	134	064
29	071	24	2.7	133	070	072
30	063	21	2.6	168	101	056

TABLE E-3

Student Number	Problem Sensitivity	Competence	Mean Competence	Bits/ Time	Shifts/ Time	Problem Sensitivity/ Time
31	104	29	2.9	149	098	060
32	074	25	2.8	075	048	060
33	073	28	2.8	104	064	060
34	076	24	2.4	147	082	087
35	066	27	2.7	166	090	083
36	082	30	3.0	179	138	073
37	062	28	3.1	146	084	050
38	084	31	3.1	185	132	056
39	045	21	2.6	196	081	066
40	076	30	3.0	164	145	049
41	037	17	2.1	143	101	041
42	056	24	2.4	154	089	066
43	091	26	2.6	151	144	082
44	077	25	2.5	174	133	057
45	069	21	2.6	147	091	062
46	101	25	2.5	161	124	069
47	058	21	2.6	171	101	038
48	036	19	1.9	166	090	040
49	070	22	3.1	138	093	066
50	090	27	2.7	138	123	050
51	083	32	3.2	154	102	090
52	097	29	2.9	221	174	093
53	075	24	2.7	216	101	071
54	085	30	3.3	154	081	060
55	095	26	2.6	157	092	063
56	083	26	2.8	101	062	060
57	098	26	2.6	118	072	065
58	046	21	2.3	135	083	037
59	064	30	3.3	132	095	062
60	082	27	2.7	112	085	048

TABLE E-4

Student Number	General Inquiry	MSU Reading	CQT Verbal	CQT Information	CQT Numerical	CQT Total
1	185	34	49	51	40	140
2	154	33	65	45	22	132
3	196	37	60	50	29	139
4	170	22	51	40	31	122
5	132	30	62	44	25	131
6	121	24	44	39	23	106
7	145	36	72	59	24	155
8	154	34	55	56	17	128
9	138	33	46	42	28	116
10	147	34	53	34	21	108
11	128	21	36	37	35	108
12	119	38	55	46	48	149
13	168	34	47	41	44	132
14	141	18	34	42	20	096
15	148	24	25	45	17	087
16	142	36	67	66	48	181
17	164	33	54	41	26	121
18	113	23	35	39	25	099
19	151	35	64	49	16	129
20	167	25	57	41	43	141
21	182	41	72	61	46	179
22	151	30	53	33	30	116
23	179	32	60	46	23	129
24	181	34	42	44	44	130
25	199	40	69	53	33	155
26	150	28	52	37	27	116
27	138	31	62	45	17	124
28	174	32	64	54	32	150
29	131	35	70	47	18	135
30	127	24	58	33	20	111

TABLE E-4

Student Number	General Inquiry	MSU Reading	CQT Verbal	CQT Information	CQT Numerical	CQT Total
1	185	34	49	51	40	140
2	154	33	65	45	22	132
3	196	37	60	50	29	139
4	170	22	51	40	31	122
5	132	30	62	44	25	131
6	121	24	44	39	23	106
7	145	36	72	59	24	155
8	154	34	55	56	17	128
9	138	33	46	42	28	116
10	147	34	53	34	21	108
11	128	21	36	37	35	108
12	119	38	55	46	48	149
13	168	34	47	41	44	132
14	141	18	34	42	20	096
15	148	24	25	45	17	087
16	142	36	67	66	48	181
17	164	33	54	41	26	121
18	113	23	35	39	25	099
19	151	35	64	49	16	129
20	167	25	57	41	43	141
21	182	41	72	61	46	179
22	151	30	53	33	30	116
23	179	32	60	46	23	129
24	181	34	42	44	44	130
25	199	40	69	53	33	155
26	150	28	52	37	27	116
27	138	31	62	45	17	124
28	174	32	64	54	32	150
29	131	35	70	47	18	135
30	127	24	58	33	20	111

TABLE E-4

Student Number	General Inquiry	MSU Reading	CQT Verbal	CQT Information	CQT Numerical	CQT Total
31	184	46	75	62	46	183
32	134	27	54	40	36	130
33	140	18	32	37	21	090
34	129	28	38	41	31	110
35	134	39	54	46	21	121
36	161	31	54	46	25	125
37	146	47	71	53	46	170
38	170	36	51	36	17	104
39	104	31	52	47	17	116
40	179	42	64	47	36	147
41	086	27	54	41	27	122
42	118	36	67	48	34	149
43	163	34	54	47	27	128
44	150	35	62	43	26	131
45	124	39	68	52	30	150
46	172	33	66	48	19	133
47	119	28	51	57	21	129
48	095	21	45	47	28	120
49	137	33	64	49	23	136
50	184	31	47	33	22	102
51	170	37	63	67	44	174
52	175	28	54	42	23	119
53	143	40	74	51	24	149
54	171	23	41	44	18	103
55	161	37	62	50	32	144
56	147	31	48	46	21	115
57	169	28	64	44	24	132
58	116	25	55	44	20	119
59	158	32	55	46	28	130
60	171	27	56	40	35	131

TABLE E-5

Student Number	Beliefs I	Beliefs II	Beliefs Change
1			
2			
3	45	74	29
4	51	65	14
5	58	74	16
6			
7			
8			
9			
10	56	73	17
11			
12			
13			
14	51	61	10
15			
16	82	86	04
17			
18	56	64	08
19	70	74	04
20			
21			
22			
23	51	62	11
24			
25	73	75	02
26			
27			
28			
29			
30			

TABLE E-5

Student Number	Beliefs I	Beliefs II	Beliefs Change
31			
32			
33			
34	51	59	08
35			
36			
37			
38	78	80	02
39			
40			
41			
42	64	73	09
43			
44	50	60	10
45			
46			
47			
48	54	61	07
49			
50			
51	55	64	09
52			
53			
54	56	65	09
55			
56			
57	61	65	04
58	79	84	05
59			
60	71	70	01

TABLE E-6

Student Number	Training	Seeking Style	Cueing
1	0	1	1
2	0	1	0
3	2	1	0
4	2	1	1
5	2	0	1
6	0	1	1
7	0	1	1
8	1	1	1
9	0	0	1
10	2	1	1
11	1	0	1
12	1	0	0
13	1	1	0
14	2	1	0
15	0	0	1
16	2	0	1
17	0	0	0
18	2	1	0
19	2	0	0
20	1	1	0
21	1	0	0
22	1	0	0
23	2	1	1
24	1	1	0
25	2	0	1
26	1	1	1
27	0	1	0
28	1	0	1
29	0	1	0
30	0	1	0

Subject Identification Key

Training - 0=Control
1=Problem Solving
2=Openness

Seeking Style - 0=Dialectical
1=Didactic

Cueing - 0=Cued
1=Not Cued

TABLE E-6

Student Number	Training	Seeking Style	Cueing
31	0	0	0
32	1	0	1
33	1	1	0
34	2	0	0
35	0	0	1
36	1	0	1
37	0	0	0
38	2	0	1
39	0	0	1
40	0	0	1
41	0	1	1
42	2	0	0
43	0	1	0
44	2	1	0
45	1	1	1
46	1	0	1
47	1	1	0
48	2	1	0
49	1	1	1
50	1	0	0
51	2	1	1
52	1	0	0
53	0	0	0
54	2	0	0
55	0	1	1
56	0	0	0
57	2	1	1
58	2	0	0
59	1	1	1
60	2	0	1

Subject Identification Key

Training - 0=Control
1=Problem Solving
2=Openness

Seeking Style - 0=Dialectical
1=Didactic

Cueing - 0=Cued
1=Not Cued