CHANGES IN LOCUS OF CONTROL: ACCOMPLISHED THROUGH THE USE OF THE PLACEBO AND THE EXPECTANCY FACTORS

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by

B. Gail Mitchell

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A THESIS

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ABSTRACT

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Purpose

The objective of this study is to determine if audio placebo feedback (in place of actual alpha feedback) and/or audio placebo feedback plus experimenter injected expectancy and/or the expectancy factor alone would differentially change locus of control orientation.

Methods

Student volunteers were pretested with Levenson's Locus of Control Scale and the first fifty questions from the MMPI scale measuring masculinity-feminity. The pretest contained seventy-four questions and was organized in such a way that every third question was a selection from Levenson's Scale. Only the items from Levenson's scale were of interest in this study. After the completion of the pretesting, only those persons scoring within two standard deviations of the mean as defined by Levenson on the Adult Scale were selected to participate. Of those, there were several drop-outs and deletions resulting in a population of sixty subjects. Before assignment to the groups, a tape recording was made from an individual who

was experienced in the production of alpha. After this taping was completed, the sixty subjects were randomly assigned, without regard to their score, to one of the three groups. After a period of ten to fifteen days, groups one and two were asked to return for placebo alpha training. In addition to the placebo alpha training, group two also received an expectancy statement. After the administration of the treatment (placebo alpha training), the students were asked to complete a posttest. Group three received their expectancy statement (treatment) immediately following the randomization of the groups. Group three was asked to return within ten to fifteen days to take a posttest. The posttest did not differ from the pretest, although if asked, the subjects were told it was similar but contained different items.

Findings

The three treatment conditions were related to the subjects' test performance in the following ways:

1. Placebo alpha had no significant effects on Internal subjects' performance on the I-scale.

2. Placebo alpha had no significant effects on Non-Internal subjects' performance on the I-scale.

3. Placebo alpha had no significant effects on Powerful Other subjects' performance on the P-scale.

4. Placebo alpha had no significant effects on

Non-Powerful Other subjects' performance on the P-scale.

5. Placebo alpha had no significant effects on Chance subjects' performance on the C-scale.

6. Placebo alpha had no significant effects on Non-Chance subjects' performance on the C-scale.

7. Placebo alpha + expectancy had significant effects on Internal subjects' performance on the I-scale.

8. Placebo alpha + expectancy had no significant effects on Non-Internal subjects' performance on the I-scale.

9. Placebo alpha + expectancy had no significant effects on Powerful Other subjects' performance on the P-scale.

10. Placebo alpha + expectancy had no significant effects on Non-Powerful Other subjects' performance on the P-scale.

11. Placebo alpha + expectancy had no significant effects on Chance subjects' performance on the C-scale.

12. Placebo alpha + expectancy had no significant effects on Non-Chance subjects' performance on the C-scale.

13. The expectancy factor had significant effects on Internal subjects' performance on the I-scale.

14. The expectancy factor had no significant

effects on Non-Internal subjects' performance on the I-scale.

15. The expectancy factor had no significant effects on Powerful Other subjects' performance on the P-scale.

16. The expectancy factor had no significant effect on Non-Powerful Other subjects' performance on the P-scale.

17. The expectancy factor had no significant effects on the Chance subjects' performance on the C-scale.

18. The expectancy factor had no significant effects on the Non-Chance subjects' performance on the C-scale.

Greg Riede, Ph.D.,
Supervising Professor

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CHAPTER I

SOCIOLOGICAL EXPLANATIONS OF CRIME

There are many theories of crime and there are many different theories regarding the treatment of criminals. There is a need to develop a theory in which explanations concerning the crime are included as well as possible conditions for change. Altering a person's perceived locus of control can be accomplished through several techniques (see Chapter II). This study will hope to show that locus of control can be altered through the use of the placebo, placebo + expectancy and the expectancy alone factors. A detailed discussion will be presented in Chapter II focusing on each of these variables. The purpose of this chapter is to present the theory that the locus of control concept is based, and compare and contrast it to several sociological theories. Contrary to many theories concerning crime, the social learning theory not only can be incorporated to explain crime as a whole but can also explain specific behaviors of an individual. The structural theory will be presented and then the symbolic-interactionism theory will be discussed. Basic assumptions will be given on each. After the comparison to the social learning theory, explanations regarding the potentiality of using the social learning theory as a basis for a treatment setting

will be discussed.

Structural Theory

The structural theory is more often thought of as originating from Merton. Merton is classified as a structural theorist and draws most of his explanations of crime from the sources in the "social order" (Nettler, 1974). Structural theorists assume that everyone in society wants more of the same things and so the theory tends to be more egalitarian and democratic (Nettler, 1974). Herschi (1969) explained the basic contribution made by Merton which was anomie. Anomie is a product of society whenever there is a discrepancy between the goals of an individual and the structured societies' legitimate means of attaining those goals (Nettler, 1974). When there are gaps between one's aspirations and the possibility of achieving those aspirations, crime is used to fill the gap. The structure of society builds desires of an individual by constantly bombarding him with the social goals. Friends, cars and status can all be bought with money or so say the television, newspapers and magazines. If these goals are available but the means of obtaining them are minimal, the individual must turn to unacceptable means to obtain the desired goals. As a result of this phenomenon, anomie has also been termed the strain theory (Herschi, 1969).

Merton (1957) provides a chart for characterizing the different types of individuals and their method for adaption to societal mean and/or goals:

	Means	Goals
Conformist	+	+
Innovator	±	±
Ritualist	+	-
Rebellionist	-	+
Retreatist	-	-

The conformist is an individual who accepts societies means and goals. A conventual businessman can be characterized as a conforming person. The innovator has accepted societies means and goals but carries some retreatist values. An example of the innovator could be a professional person using blackmail to obtain more money. He has accepted the means (professional training) and accepted the goals, but is still trying to meet those goals through illegitimate channels. A ritualist type person could be a preacher. The preacher has accepted the means (attending seminary) but rejects the goals (monetary reward). In order to do what he likes best the ritualist uses the appropriate means. An example of the rebellionist is an individual who wants the goals (perhaps money and security) but does not want to go through the appropriate means of obtaining these goals. This type of characterization is probably most consistent with the

crimes in society today. The criminal wants to have the property and wealth associated with most people but the means of obtaining these possessions are minimal. The retreatist has rejected both societies' means and goals. An example of this type of behavior would be the drug addict. The major interest in his life is drugs. The only thing he worries about is obtaining and using these drugs. Another example of the retreatist would be a hermit. Anomie occurs when there is a strain between the individual's perception of the goals and the probability of obtaining these goals.

Differential Association Theory

The person most closely associated with the differential association theory is E. H. Sutherland. Sutherland has incorporated a learning theory into a sociological explanation of crime. The major assumptions of the differential association theory are:

1. Criminal behavior is learned behavior.
2. Learning such criminal behavior includes learning both the techniques of committing the crime and the motives for committing it.
3. Specific direction of motives and drives is learned from definitions of the legal codes as favorable or unfavorable [Sutherland and Cressy, 1970].

These major assumptions as Nettler states are "common-

sense ideas that people are apt to behave criminally when they do not respect the law" [1974, p. 194]. The term differential association refers to a changing balance within each person among the definitions he has learned to associate with categories of behaviors defined by society as legal or criminal. The definitions formed are attitudes or evaluations and are presumed to be motivating (Nettler, 1974). This theory and the strain or structural theory have many similar points. They serve as a basis for the development of the social learning theory. The social learning theory will be presented, followed by comparisons to the sociological theories.

Social Learning Theory

The social learning theory was developed over a span of about twenty years by Julian Rotter (1972). The major assumptions of the theory as a whole are:

1. The unit of investigation for the study of personality is the interaction of the individual and his meaningful environment [Rotter, 1954].

2. Emphasis is on learned behavior. Attitudes, values and expectations are seen as more useful than instincts or hormones.

3. There is unity to personality. Although an individual may experience a new situation, a common bond between each of these experiences goes to make up his personality. As a person becomes older and his experiences are limited his personality tends to become more consistent than when he was exposed to many different

and varied situations.

4. Social learning theory emphasizes both general and specific determinants of behavior.

5. There is a purposeful quality to human behavior. People are goal-seeking and behavior can be said to be motivated. People seek to strive for an aspect or they tend to avoid it.

6. The occurrence of a behavior of a person is determined not only by the nature or importance of goals or reinforcements but also by the person's anticipation or expectancy that these goals will occur [Rotter].

Although these assumptions make up the social learning theory concept, Rotter (1968) has stressed four essential points which can be used to determine behavior. These are: (1) the potential of behavior occurring; (2) the expectation that individuals hold regarding specific behaviors and the occurrence of reinforcements; (3) the reinforcement value held regarding the hierarchy of behavior patterns; and (4) the psychological situation the individual is experiencing which relates to the behavior potential.

Contrast Between the Social Learning Theory and the Structural Theory

With these assumptions in mind, it is interesting to compare this theory of behavior with different sociological explanations of crime. Although the social learning theory deals with individuals and the theory

behind specific behaviors and sociological explanations deal with collective behaviors, a correlation can be found that may be useful in dealing with individuals in an institutional setting.

The theory of anomie and the social learning theory are similar in that both pay attention to the individual and his interaction with society. Anomie suggests that people want basically the same things, but the method of attainment differs; the social learning theory emphasizes the interaction as an aspect of personality. According to Seeman (1963), Merton is asking the question: What alternative resolutions are open when an individual has learned to place high value on a given goal though his expectancies for attaining that goal by approved means are very low? Merton answers that question by developing his goal-and-means-type of behavioral adjustment. This is similar to Rotter's theory in that there is an inconsistency between highly valued goals and low subjective probabilities of achievement. There is also a similarity in that there is an inconsistent demand of society and the opportunities for achievement. Both theories deal with expectancies either from society or individual. Both are situational. There are also similarities of the social learning theory to the differential association theory.

Contrast Between the Social Learning Theory and the Differential Association Theory

As can be seen by the brief description of the sociological theory of differential association, there are similarities between the two theories. Melvin Seeman (1963) points out two important similarities:

1. Differential association teaches an individual the value of criminal activity--for itself, or for what it gets him as a deviate (friends, group belonging, respect).

2. Provides expectancies concerning the likelihood of success in achieving these goals (chances of being caught, procedures which guarantee success).

In both of these instances the behavior is learned. The concept of learned behavior is consistent throughout these three theories. The social learning theory operating on the basis that an individual places beliefs in specific situations returning greater reinforcements parallels to point one. If importance is placed on peer acceptance or respect, the individual will return to such a situation. If the expectancies of achieving the desired goals seem enhanced by a specific situation the individual will return hoping to achieve those goals. Expectancies may prove to be a valuable factor in the treatment area of corrections. This is discussed in more detail in Chapter II.

The preceding comparisons were made in order to compare the social learning theory to other theories which are usually used to explain collective behaviors. However,

as can be seen, each of the theories presented contain similarities and each deals with the concept of learned behavior and expectancy. Contrary to the sociological explanations, the social learning theory has become the basis of a scale developed by Rotter (1952) which has become useful in predicting individual behaviors. This scale deals with an individual perception of his control of reinforcements. If an individual is thought to be in control of his reinforcements he is internality oriented. If other people, chance, luck or fate are perceived by the individual as playing a more important role in obtaining reinforcements the person is thought of as externally oriented. This will be discussed in Chapter II. An important point to bring out is this orientation can be changed. Through the development of sociological theories which explain collective behaviors, a theory has been developed to not only explain the behavior but also provide a basis for treatment in the changing of those behaviors.

Summary

The purpose of this chapter was to present sociological explanations of crime which deal primarily in explaining collective behavior. The theories being Merton's structural theory and Sutherland's differential association theory. This presentation was an attempt to

point out the need for a sociological theory which explains collective behaviors but which also serves as a basis for a treatment theory. The social learning theory was then presented as one possible alternative. By combining a sociological theory and a treatment process, it may be possible to treat groups of individuals rather than one individual. Since society is made up of groups of people, the ideal treatment must come from groups. Comparisons were then made: the social learning theory to the structural theory and the social learning theory to differential association. The conclusions being the social learning theory may be considered as a basis for a treatment process.

CHAPTER II

REVIEW OF LITERATURE ON BIOFEEDBACK, LOCUS OF CONTROL, PLACEBO AND EXPECTANCY

With the increased interest of our biological functions, coupled with the knowledge we now possess in the field of electronics, a new area has emerged called biofeedback. Biofeedback is information gained about the biological functions of our body (e.g.; heart rates, blood pressure, alpha wave production) transmitted through a receiver and converted to either audible or visual signs. These are usually in the form of a beep or a light. When given this information, an individual is able to learn to control these processes which were formerly thought to be autonomic. The person who has been most influential in promoting the use of biofeedback is Barbara B. Brown. She has been responsible for many major contributions within the scientific setting ranging from pharmacology to cardiovascular medicine.

The concept of biofeedback is probably best known to people practing Yoga or Zen. There are incidents when yogis have apparently stopped their heart by obtaining voluntary control over its functioning. In reality the heart had not stopped but merely slowed to such a point it was difficult to detect its beating. The yogis accomplished this feat through respiratory and skeletal muscle maneuvers.

Other examples indicating the control obtainable over bodily functions are: producing perspiration at will, lowering the pulse, lowering temperature and even walking over hot coals (Jonas, 1962).

Biofeedback has been used in many aspects of the treatment setting. Biofeedback has been used in the areas of drug abuse (Lebow and Allen, 1971), sub-vocalization and stuttering (Aaron, 1971; Lader, 1971; Mathews, 1971). There are many applications of the broad term biofeedback, but of interest to this study is relationship of biofeedback to one's perceived Locus of Control.

Dependent Variable--Locus of Control

As mentioned in Chapter I, the concept of locus of control developed from a social learning theory by Rotter. It is based on the idea that as a person grows and experiences different situations, the expectancies as to the outcome of his behavior will be generalized to other situations having similar characteristics. The concept of locus of control has been used to develop an I-E scale which is used to characterize different types of people. The internal (I) factor describes those persons who feel they control the frequency of reinforcements they receive. The external (E) factor characterizes those who feel they have no control over reinforcements they receive

or the frequency of their occurrence (Phares, 1976). The concept of the internal-external locus of control has been studied with the validity of this concept being supported (Nowicki, 1973). Those who found this concept to be of value include: Rotter, 1966; Crowne and Liverant, 1972; Tolor, 1971; and Joe, 1971. The concept of locus of control is not a sharp dichotomy, however, it has been found that persons scoring on the extreme ends of the scale (either internally or externally) tend to be psychologically less well-adjusted than those scoring within one standard deviation of the mean (Gurin, 1969). The development of the locus of control scale is drawn directly from the concept of Rotter's Social Learning Theory. The social learning theorists explain goal-directed behavior in a formal equation (Rotter, 1954; Rotter, Chance and Phares, 1972) from Woodward (1976):

$$BP_{xgs_1Ra} \quad f(E_{xlRa_1S_1} \ \& \ RV_{a.b.})$$

> Given a particular situation (1) and a particular reinforcement (a), the potential for a behavior (x) to occur is a function of the expectation that the particular reinforcement (a) will occur, given the behavior (x) and the specific situation (1) and the value of reinforcement (a) or the relative preference of reinforcement (a) in the situation (1).

This equation has been modified to represent behavior involving more than one response (Rotter, et al, 1972). Basically, this equation involves four variables: a situation, the reinforcement, the expectation of reinforcement and the

value of the reinforcement. Each of these variables depend on the individual's perception at one particular moment. Behavior potential is a function of expectancy and reinforcement and the value placed on that reinforcement in a specific situation. With the use of the internal-external variable of the locus of control concept, the prediction of these potential behaviors can be examined.

Variables Related to Internality and Externality

Within the concept of internality and externality factors have been identified as characteristic of each. Factors which are related to internality in individuals include a higher self-concept, are usually better adjusted, are more independent and show more effort in controlling their impulses (Phares, 1976). Internality in males was related to positive perceptions of maternal behavior and in females it was related negatively to maternal protectiveness (Levenson, 1973). Other studies which characterize the concept of internality include: Davis and Pharis, 1969; Jessor, Graves, Hanson, and Jessor, 1968; Tolor and Jalowiec, 1968. These studies dealt with the internality of parents as compared with that of internality in their children (Phares, 1974).

Externality has been correlated with anomie,

powerlessness, and alienation, and is characteristic of minority groups (Tilken, 1975). Externals tend to be more anxious, hostile, suspicious, dependent and tend to exhibit behavior which is inconsistent with those who attempt to control their lives (Joe, 1971). Externals tend to prefer chance tasks (Schneider, 1968) and also tend to say unfavorable things about themselves and their behavior (Hochreich, 1973).

Altering Locus of Control Orientation

Since recent research has indicated many individuals now occupying our correctional facilities are externals, it would be beneficial to consider possible means of altering a person's locus of control. Alteration of locus of control has been noted by several researchers. Penk (1969) found older children to be more internal than younger children, indicating a relationship between locus of control and the aging process. Penk (1969) also notes that a time passage of a smaller span has been found to be related to control expectancies during a period of incarceration. Kiehlbauch (1968) found reformatory inmates acknowledged higher externality upon admission and shortly before release than during the middle period of their confinement. Mastellone (1969) supports the findings of Kiehlbauch (1968) but also found that manifest anxiety scores covaried with the I-E scores. As Mastellone (1969)

states, "As release time approaches, uncertainties rise concerning coping on the streets and a resurgence of helplessness and anxiety is reflected" [p. 87]. Treatment modalities which have been used in attempting to alter an individual's locus of control include a counseling technique by Masters (1970) which was designed to alter the way a person perceives his position and directing this to shift externals to internals (MacDonald, 1972). A counseling technique which has been used in both individuals and groups was developed by Schaefer (1970) and has been useful in shifting externals to an internal locus (MacDonald, 1972).

History of the Placebo

Before discussing the implications the placebo effect will have in connection with the present study, a brief historical background will be given along with several examples depicting the role the placebo has played in medical research. The medical definition of placebo which is currently used is:

> the psychological, physiological or psychophysiological effect of any medication or procedure given with therapeutic intent which is independent of or minimually related to the pharmacological effect of the medication or to the procedure, and which operates through a psychological mechanism [Shapire, 1974].

Even the word 'placebo' is interesting to trace. The word itself can be traced back to the 13th century when

it was used in referring to sycophancy and servility as a noun meaning a flatterer or parasite. The meaning of the word as we know it today was perhaps first used by John Redman Coxe. He referred to the placebo as a common-place method of medicine. Placebo was defined as a verb in the Latin translation:

> the first person singular of the future indicative of the Latin verb "to please," the word placebo itself being equivalent to the phrase, "I shall please" [Shapire, 1974, p. 230].

These were the basic forms the definition of the placebo took but it will become fairly obvious that the placebo has been used in approximately the same way.

There are several ideas and thoughts which have been contributed to the area of placebo. Many of these reflect different opinions regarding the use of placebos. One such thought dates back to the 15th century when Paracelsus stated:

> ... whether the object of your faith be real or false, you will never the less obtain the same effects ... Faith produces miracles and whether it be true or false, it will always produce the same wonders [Shapiro, 1974, p. 232].

Another idea that was shared (Shapiro, 1974) was from Fantus, who practiced medicine in the early 1900's. He felt the use of placebos should only be used when imaginary illnesses were present and/or with patients with low intelligence.

These were the first definitions used and some of

the thought behind their uses. However, it is interesting to know what types of placebos were used in the days before valid and proven medicine had been developed.

Examples of some of these medical wonders may again be found in the article by Shapiro. For example, if a person had suffered a possible poisoning, he would most likely have been cured by drinking crushed unicorn horns. Actually the men of medicine substituted ivory in place of the unicorn horn, but the idea of telling people they were drinking unicorn horns improved their rate of success. Another antidote which was considered valuable in the treatment of poisoning was bezoar stone, which was actually the gall stone of a goat. The universal antidote and an aid to the healing process was the favorite, powdered mummy. Mistletoe at one time was also thought to have had some type of curative value. It was used in treatment of corns, frostbite, apoplexy, infertility and the bubonic plague. As late at the 17th century, Sir Charles Locock used mistletoe as a cure for epilepsy when he believed this ailment was caused by crowded teeth.

The placebo has regained much of its respect within the last fifty years. It has been recognized as a potential determining factor when experimenting with new drugs. Gold (Shapiro, 1974) was the first person to use the placebo in a blind test and later in the first double

blind test. By 1946, physicians were beginning to use placebos in regular trial runs with new drugs.

Reasons that may point to the late interest of the placebo are stated by Shapiro (1974):

1. Anxiety or threatening (if the patient was told he was taking a placebo, the effect would be lost)
2. Doctors may feel threatened by the loss of the magical powers they are thought to possess
3. Lack of knowledge or ridigity of thinking
4. Doctors may feel as though the placebo effect is not of value and that it should not be experimented with or studied.

These reasons are basically ego-threatening to the physician and should not have been considered as valid reasonings. It seems that any aspect helpful in determining the effectiveness of a treatment or improving effectiveness would be welcomed. It seems that more and more physicians and other persons working within a treatment framework are turning to the use of placebos in order to establish the worth of their particular accomplishment (Shapiro, 1974).

The preceding information has traced the role of the placebo primarily within the realm of the medical setting. The placebo, additionally, has played a very important part in the area of biofeedback research. There are many studies which have different biofeedback techniques. One such study by Grynol and Jamison (1975) discusses the use of the placebo in a study concerning alpha feedback and

relaxation. The subjects in this study were female college undergraduates. Two groups were formed in which one received correct alpha feedback and one which received correct and incorrect feedback. Both reported positive psychological benefits on two anxiety measures, indicating the existence of a placebo effect.

Two groups of males viewed slides of semi-nude females. In one group, they heard their bogus heart rate feedback significantly increase to five of the slides. While their bogus heart rate feedback remained unchanged to the other five slides. In the second group, the males heard their bogus heart rate feedback significantly decrease to five of the slides while it remained unchanged to the other five. At the end of the program, subjects reports in comparison with the slides to which they heard a marked change, whether increased or decreased, (1) rated significantly more attractive during the experiment and during a disguised interview conducted 4-5 weeks later, and (2) chosen significantly more for renumeration for experimental participation (Valins, 1966).

Barefoot and Straub (1971) also did a study involving bogus heart rate. They conducted essentially the same experiment as Valins, reaching primarily the same conclusion in regard to rating and renumeration.

A study conducted by Riddick and Meyer (1974) was concerned with the efficacy of automated relaxation training

with response contingent feedback. Three conditions were used with one of them being placebo. Three objective measures were used to determine the results: heart rate, gross motor movement and galvanic skin response. Two subjective measures were also used: Although the placebo condition was rated inferior to the other conditions on the objective measures, it was rated equal if not superior on the subjective measures. This study points out the inaccuracy humans possess when trying to report their own physical state. It does lend support to the placebo effect and also points out the necessity of using true feedback.

A study (Teja, Jagdish S.; Shah, Dinesh K; and Wig, Narendra N., 1975) related to medical treatment but which points out the need for a placebo was done on anxiety patients. The study was concerned with the use of Benzoctamine, a new anti-anxiety agent and a placebo on twenty-five out-patients with anxiety neurosis. The results of the study pointed out that Benzoctamine was not significantly better than placebos in reducing the total scores on twenty-five item objective anxiety rating scales. It had a significant effect on the symptom of anxiety but the placebo produced significantly better results in some patients. The researchers believed this could have been due to the lesser number of patients who had side effects on placebo.

The results of these studies support the placebo effect. Since the placebo effect showed significant results, it is imperative that the use of the placebo be incorporated in the area of biofeedback research. Only in this way can we be confident that our results reflect correct information regarding the usefulness of biofeedback training.

Karlins and Andrew (1972) give their suggestions as to why the placebo effect seems to work so well. They state that for many years doctors and psychologists believed man to be in more control of his system than he realized. The reasons given to the success rate of recovery are: (1) faith in the doctor, (2) a belief in the effectiveness of the medicine, and (3) the psychological basis of his condition.

Brown (1974) compares the placebo and biofeedback and feels both are very similar, in that both are drugless and both potential benefits originate in the mind. She does point out differences which she feels are important to recognize. As she states, "the placebo action stems from nebulous subconscious desire while biofeedback effects are accomplished by awareness and learning" [p. 135]. This thesis will investigate the coupling of this desire and bogus feedback to measure the self-reported significant positive change in subject experienced treatment effects.

The Expectancy Factor

Expectancy is defined as a subjective probability or contingency held by the individual that any specific reinforcement or group of reinforcements will occur in any given situation or situations (Rotter, Chance and Phares, 1972). Also pointed out is that subjective qualifications are necessary because expectancy is also a combination of:

1. probability calculated on past experiences of one's past history of reinforcement but also by:
2. the generalization of expectancies from other related behavior reinforcement sequencies [Rotter, Chance and Pharis, 1972].

A formal equation which expresses expectancy is given by Rotter, Chance and Phares (1972):

$$E_{s_1} = f(E'_{s_1} \ \& \ GE)$$

Expectancy (E_{s1}) is a function of probability of occurrence based on past experience in situations perceived by S as the (E'_{s1}) and his generalization of expectancies for the same or similar reinforcements to occur in other situations for the same or functionally related behavior (GE).

This equation can be modified to include the number of times an individual is placed in the same situation, which is a factor which should not be ignored:

$$E_{s_1} = f\left(E'_{s_1} \ \& \ \frac{GE}{Ns_1}\right)$$

This equation refers to expectancy as a function of the expectancy for a given reinforcement to occur resulting

from previous experience in the same situation (E'_{s1}) and as a function of the number of experiences in the specific situation (Rotter, Chance and Phares, 1972).

Rotter, Chance and Phares (1972) make another noteworthy observation about expectancy. They state that behavior is a function of both expectancy and reinforcement so behavior can be changed by manipulating one of the variables. However, it is often easier to change expectancies rather than reinforcements.

Battle (1966), Crandell and McGee (1968), Coleman, et al (1966) conducted studies which found that expectancy statements made regarding academic performance tend to predict actual performance.

A study which is directly related to the area of biofeedback and that has used expectancy factors is one conducted by DeGood, Valle, Elkin and Lessin (1975). Subjects were read an expectancy statement prior to alpha production training. Their results confirmed the hypothesis that the expectancy effect may be present as an individual subjective variable which can be measured by a questionnaire.

There are two variables that operate to affect the size of expectancy changes (Rotter, Chance and Phares, 1972):

1. The surprise value of occurrence. With both positive and negative reinforcements, an unexpected occurrence has a greater effect than an expected one. However, it must be of such a nature to permit recognition, otherwise it may be thought of as random or specific to

one situation only.

2. The number of previous experiences the subject has had in the situation. With a lot of experience in a given situation, a recent, inconsistent experience will have little effect on our expectancies unless cues suggest the situation itself has changed.

These variables are subject to change and have been used in predicting future behavior and shaping future patterns of behavior. Behavior is a function of both expectancy and reinforcement, so changes in behavior can be obtained by manipulating either one or both variables.

It is important to study the expectancy factor in experimental studies and the present study will account for both the expectancy and the placebo variables. It will show the power of an expectancy statement and it will also demonstrate whether or not the idea of success will carry over when evaluated in terms of completely false alpha feedback.

This chapter presented the review of literature on biofeedback, locus of control, placebo and expectancy. The need to study these variables is great, especially in the area of biofeedback. Before thousands of dollars are spent on biofeedback machinery, the effects of the placebo, placebo + expectancy and expectancy alone need to be evaluated.

CHAPTER III

METHODOLOGY

Introduction to the Study

Much of the research done in the area of Locus of Control tends to show that persons scoring within the external area of the Scale and those scoring in the extreme limits of externality often exhibited socially undesirable behavior. Lefcourt (1966) has noted that a large proportion of correctional institutions are comprised of these individuals.

Many types of treatment programs were utilized to try to alter a person's perceived locus of control; for example, McDonald (1972), Dua (1970) and Mink (1971). Another potential treatment statagy which can be used in shifting an individual's perceived locus of control is biofeedback. However, before investing large sums of money into biofeedback equipment, several conditions should be considered. The purpose of this study is to investigate three conditions which may affect the success of program in biofeedback training.

It is hypothesized that through the use of a placebo and a placebo coupled with experimenter injected expectancy and an expectancy only factor a change of Locus of Control will be achieved. The present study is designed

to determine whether or not placebo alpha, placebo alpha plus expectancy or expectancy alone can be utilized to impact an individual's locus of control orientation effectively.

Statement of Research Hypotheses

There will be a statistically significant difference ($P \leq .05$) between the placebo, placebo plus expectancy and expectancy alone group means and the pre-treatment control group mean on the dependent variable measure of locus of control. The hypotheses state:

1. Internal subjects' performance on the I-scale will be changed by placebo alpha treatment.
2. Non-Internal subjects' performance on the I-scale will be changed by placebo alpha treatment.
3. Powerful Other subjects' performance on the P-scale will be changed by placebo alpha treatment.
4. Non-Powerful Other subjects' performance on the P-scale will be changed by placebo alpha treatment.
5. Chance subjects' performance on the C-scale will be changed by placebo alpha treatment.
6. Non-Chance subjects' performance on the C-scale will be changed by placebo alpha treatment.
7. Internal subjects' performance on the I-scale will be changed by placebo alpha treatment + expectancy.

8. Non-Internal subjects' performance on the I-scale will be changed by placebo alpha treatment + expectancy.

9. Powerful Other subjects' performance on the P-scale will be changed by placebo alpha treatment + expectancy.

10. Non-Powerful Other subjects' performance on the P-scale will be changed by placebo alpha treatment + expectancy.

11. Chance subjects' performance on the C-scale will be changed by placebo alpha treatment + expectancy.

12. Non-Chance subjects' performance on the C-scale will be changed by placebo alpha treatment + expectancy.

13. Internal subjects' performance on the I-scale will be changed by the expectancy factor.

14. Non-Internal subjects' performance on the I-scale will be changed by the expectancy factor.

15. Powerful Other subjects' performance on the P-scale will be changed by the expectancy factor.

16. Non-Powerful Other subjects' performance on the P-scale will be changed by the expectancy factor.

17. Chance subjects' performance on the C-scale will be changed by the expectancy factor.

18. Non-Chance subjects' performance on the C-scale will be changed by the expectancy factor.

Sample

The sample was drawn from undergraduate student volunteers from the Institute of Contemporary Corrections and the Behavioral Sciences, and the Psychology Department

at Sam Houston State University. The total sample size consisted of sixty subjects. Twenty subjects, male and female, were then randomly assigned to one of three groups: group one received placebo alpha training; group two received placebo alpha training plus an expectancy statement; group three received only an expectancy statement. Males and females were equally proportioned to each group reflecting the same population (e.g.; 12 females and 8 males per group).

After the completion of the pre-testing, a period of 10-15 days passed before each of the subjects reported for one fifteen minute treatment session. Each subject was then asked to sit down with his back to the equipment. Electrodes were placed on the subjects' heads as well as a set of headphones. Headphones were used to provide the subjects with direct connection to the beeps obtained from an alpha training session, as well as to mask any extraneous noises from the adjoining room. Immediately following their session, the subjects were asked to complete a posttest which was identical to the pretest.

Placebo Alpha Treatment Group plus Expectancy

Each of these twenty subjects received the identical treatment session as the placebo alpha group plus they were read an expectancy statement (see instructions). Immediately after their session, they too, completed a posttest.

Expectancy Alone Group

After the subjects who were randomly assigned to this group completed their pretest, they were read an expectancy statement and were then asked to come back within 10-15 days. The actual expectancy statement used is included in the instructions section. When the expectancy subjects returned, they were asked to complete the posttest.

Instructions

The instructions given to the placebo alpha training group were as follows:

> You will now receive Alpha Biofeedback training. The more "beeps" you hear, the more Alpha you are producing. Try to increase the number of "beeps" you hear. No information can be given regarding the production of Alpha with the exceptions of:
>
> 1. The ability to produce Alpha is enhanced when you are relaxed.
>
> 2. Try to clear your mind and reduce your level of concentration.

Each subject read these instructions and was then asked if he had understood them. After any explanations that were needed, the subject was then lead into an adjoining room which was separated by a door. After seating the subject, his back to the equipment, these instructions were given:

1. Alpha is most prevalent when the eyes are closed and the room is darkened.

2. This training will last fifteen minutes.

3. Please do not tamper with the earphones or the electrodes.

While giving these instructions to the subject, the experimenter was attaching the electrodes to the subject's head. To be consistent with the instructions, each subject was asked if he was right or left handed to establish brain dominance and therefore lend credibility to the electrodes and the equipment. After the attachment of the electrodes each subject was told to blink his eyes in order for the experimenter to adjust the machine. During this process, the experimenter held the headphones and knobs were turned, switches were switched but the alpha machine remained off. Since the recorded beeps could only be heard through the headphones, the subjects were not aware of the ineffectiveness of their eye blinks. Upon completion of these tasks, the overhead light was turned off and the treatment session began. After the fifteen minutes had past, the lights were turned on and the subject was disconnected. All were asked if they felt they had done well. All were told by the experimenter that they seemed to be doing well. The subject was then directed into the first room to complete the posttest. A lab coat was worn by the experimenter to enhance the treatment situation.

Placebo Alpha plus Expectancy Group

The subjects were treated identically as the placebo

alpha group with the exception of the expectancy statement. This statement was read to the subject and explained. The expectancy statement for this group was:

> We have found that, based on your pretest score, you are experiencing a period of increasing self-control.
> We have also found, through research, that when people who are in this period of increasing self-control, this training greatly enhances any power of self-control.
> Be aware of any changes in yourself that will indicate this increasing self-control while producing alpha.

Other than this statement, the procedure did not differ between these two groups.

Expectancy Group

After completion of the pre-testing, the subjects who were randomly assigned to the expectancy group were scheduled for an immediate appointment. At that time each subject was administered on an individual basis, an expectancy statement which read as follows:

> We have found that, based on your test score, you are performing like people who are currently going through a period of increasing self-control.
> Based on this, be aware of any changes in yourself that will indicate increasing self-control within the next 10-15 days.
> We would like to have you meet with us at the end of this period and discuss any changes.

At the end of this time period the subjects returned to take the posttest.

Scheduling

The scheduling of the subjects was done on an

individual basis to insure a convenient appointment time. Alternative or make-up sessions were available to keep within the designated time period of 10-15 days.

Setting

The treatment setting consisted of two adjoining rooms separated by a door. The larger room was used as the treatment setting. One-third of this room was separated by a room divider. This provided an area of concealment in which the recorder and amplifier and other equipment was stored. The furniture contained in the treatment room consisted of three chairs. Two of the chairs were provided for subject use, while the third served the purpose of holding the personal belongings of the subject. The subjects were provided with a pillow to lean against and were told to use the other chair as a footrest if they wished. A small tensor lamp concealed behind the room divider was used to provide light after the overhead lights were turned off.

The experimenter remained in the room behind the divider throughout the entire treatment session. This was done to discourage any tampering with the equipment by subjects and also to moniter the equipment to avoid malfunctions.

Instrumentation

All sixty subjects were administered a pretest consisting of Levenson's Locus of Control (I-E) Scale and fifty statements from the MMPI masculinity-feminity scale. To protect against test sensitization, Levenson's items were injected as every third question resulting in a pretest consisting of seventy-four statements. Response to the statements were a forced choice ranging from a -3 to a +3 with no zero. After the subjects had completed the pretest, they were randomly assigned without regard to their score, to one of three groups. Once the groups were formed, the subjects were then divided into two categories using the three variables of the Levenson's Scale. Each subject was designated as either a high internal (above the mean) or a low internal (below the mean). This was also done on the variables of Chance and Powerful Others. Scores on one or more of these variables were not considered when group assignment was made; therefore, after assignment to groups there were eight males and twelve females in group one or placebo alpha, eight males and twelve females in group two or placebo plus expectancy, and eight males and twelve females in group three or the expectancy alone group. In a companion study, the treatment effects of alpha, alpha plus expectancy and expectancy alone were studied. For a brief synopsis of this study see Appendix B.

An individual who was experienced in the production of alpha was asked to help in this phase of the study. While she produced alpha, her feedback was being recorded on a reel-to-reel tape recorder. An alpha scan 400 alpha-theta brainwave analyzer produced by Bio-Scan Corporation was used for this experiment. The equipment has the following specifications:

Analog Section

Equivalent input noise: less than 1 microvolt peak (0.7 microvolts RMS), measured with grounded inputs, referred to input.
Input impedance: greater than 2 Megohms.
Input bias current: less than 10 nanoamps.
Common mode rejection ratio at 10 Hz.: 1,000,000 to 1 (120 dB.) measured at differential stage only.
Common mode rejection ratio at 60 Hz.: 100,000,000 to 1 (160 dB.) measured through analog filters.
Analog filters: Differential section--single pole high frequency filter, 6 dB./ octave roll-off (20 dB./decade), -3 dB. point at 25 Hz.
Low frequency--3 pole active Butterworth type, 18 dB./ octave roll-off (60 dB./decade), -3 dB point at 4 Hz.
High frequency--3 pole active Butterworth type, 18 dB./ octave roll-off (60 dB./decade), -3 dB point at 16 Hz.

Digital Analysis

Type of analog-to-digital conversion: frequency to time conversion
Type of digital frequency analysis: pulse width comparison.

Feedback

Audio: built-in speaker, normal or reverse model.
Visual: built-in red LED (light emitting diode).

Controls

Electrode input plug.
Power off/on switch.
Amplitude threshold, continuously variable, calibrated 5-150 microvolts peak.
Digital filter, high frequency cutoff, calibrated 5-16 Hz. in 1 Hz. increments.
Speaker off/normal mode/reverse mode switch.
Speaker volume.
Light off/on switch.

Outputs (standard; others available on request)

Ground: provides ground reference for accessories
Analog filter: Filtered EEG, 1 millivolt per microvolt (gain-1,000).
Audio: Gated 450 Hz sine wave feedback signal.
Z/C/D: Digital pulse whose width is equivalent to EEG frequency. TTL compatible.
A/D Converter: Digital pulse whose width is equivalent to EEG frequency; present only when amplitude parameter is met. TTL compatible.
Digital filter: Digital pulse whose width is equivalent to EEG frequency; present only when amplitude and frequency parameters are met. TTL compatible.

Components

15 integrated circuits (IC's) containing the equivalent of 345 transistors, 261 resistors, 62 diodes, and 8 capacitors.
Discrete components: 8 transistors, 50 resistors, 6 diodes, and 22 capacitors.

Physical

Power: Four nine volt alkaline batteries (NEDA #1604OA) and four 1.5 volt alkaline "C" cells (NEDA #14A).
Cabinet: Painted aluminum and simulated wood finishing.
Size: 8" long x 4 1/2" tall x 6 1/4" deep.
Accessories included: Electrode assembly with headband and 3 silver/silver chloride electrodes.

Specific Calibration

Common Mode rejection ratio (CMRR) $a^{1}10H_{3}$ $7x10^{6}$

Equivalent input noise, measured with grounded inputs, referred to the input	.3 UVPK

Analog Filters:

High Frequency - 3dB. point	15.1 Hz
Low Frequency - 3dB. point	3.2 Hz

A tape recorder was used as a device which would provide a pre-amplifyer for the signal which the subject was producing. Since the Alpha Scan has a power source which consists of dry cell batteries, headphones could not be used from this power source. Headphones were used to filter extraneous noise from outside the training room and to insure that the subject did not tamper with the electrodes. The TEAC A-1500 has the following specifications:

Heads	Four, 4 track 2 channel Erase, Record, Forward playback and Reverse playback
Reel Size	7" maximum
Tape Speed	7 1/2 and 3 3/4 ips (± o.5%)
Motors	1-dual speed hysteresis motor for capstan drive 2-eddy current type outer rotor motors for reel turntables
Wow and Flutter	7 1/2 ips 0.12% 3 3/4 ips 0.15%
Fast Winding Time	Approximately 100 seconds for 1,200 feet
Frequency Response	7 1/2 ips 30 to 20,000 Hz (±3 dB 50 to 15,000 Hz) 3 3/4 ips 30 to 15,000 Hz (±3 dB 50 to 10,000 Hz)
Equalization	50 microseconds (NAB) for 7 1/2 ips 90 microseconds (NAB) for 3 3/4 ips

Signal to Noise Ratio	50 dB
Crosstalk	50 dB channel to channel at 1,000 Hz 40 dB between adjacent tracks at 100 Hz
Input	Microphone: 10,000 ohms, 1 mV minimum Line: 100,000 ohms, o.1v minimum
Output	1v for a load impedance of 100,000 ohms or more
Power Requirements	100/117/200/220 V AC 50/60 Hz 1 low nominal
Weight and Dimensions	17" x 15 1/2" x 9 3/4" 46 lbs.

The outputs, audio and ground from the Alpha Scan 400 were connected to the input jacks of the TEAC A-1500. The headphones were of 10,000 ohms minimum and were plugged into the phone jack of the TEAC A-1500. Volume settings were pre-adjusted and remained constant throughout the groups.

Statistics

An analysis of variance was used to determine significance. To arrive at this data, the subjects' pre and posttest scores were divided by the grand mean of each dependent variable scale: Internal, Powerful Others and Chance. Those subjects whose score fell on the mean and above were considered internals and those below the mean as non-internals on the internal scale. Those subjects whose score fell on or above the mean on the dependent variable Powerful Others or Chance were considered Powerful

Others or Chance. Those whose scores fell below the mean were considered as Non-Powerful Others and Non-Chance on each of the respective scales. After treatment, posttest internals were compared to pretest internals; posttest non-internals were compared to pretest non-internals. This process was repeated for both the Powerful Other's Scale and the Chance scale. Throughout the study, pretest scores were used for comparison (control group).

Analysis

An analysis of variance was used to determine significance between the following groups and their respective control group:

Internal - Non-Internal; Powerful Others - Non-Powerful Others;

Chance - Non-Chance. If significance was found using ANOVA, Dunnett's Multiple comparison method was then utilized to determine which treatment condition produced the significance.

CHAPTER IV

RESULTS

A companion study utilizing two variables (alpha biofeedback treatment and alpha biofeedback treatment + expectancy) which were independent of the instant study was analyzed with and has been included within the results and tables. An asterisk notes the companion study (*). A third group, expectancy, was shared by the companion study and the instant study which is noted by two asterisks (**). For a brief description of the companion study refer to Appendix B. For a more indepth analysis of the companion study refer to Slade (1976).

Findings of the Hypotheses

Findings with Respect to the First Hypothesis

It was stated in the first hypothesis that Internal subjects' performance on the I-scale will be changed by Placebo Alpha Treatment. Through the use of the analysis of variance, significance was found at the .0001 level for all treatment conditions. Implementing Dunnett's multiple comparison procedure for comparing several treatments with a control group (two-tailed), the minimum requirement for significance in this comparison is 2.57 which was computed at the .05 level of significance. This value was met or exceeded by the following treatment conditions: *Alpha -

2.90; Placebo + Expectancy - 2.78; **Expectancy - 3.36. Since Placebo Alpha did not reach the specified level of significance the research hypothesis was not supported. Table 1 provides visual information concerning this information.

Findings with Respect to the Second Hypothesis

It was stated in the second hypothesis that Non-Internal subjects' performance on the I-scale will be changed by Placebo Alpha Treatment. Through the use of the ANOVA, no significance was found at the specified level for any of the treatment conditions, thus the research hypothesis was not supported. Using Dunnett's multiple comparison method is was necessary to exceed 2.57 to first significance at the .05 level. The **Expectancy group received a 2.44 which may indicate a trend. Refer to Table 2 for the visual display of these results.

Findings with Respect to the Third Hypothesis

It was stated in the third hypothesis that Powerful Other subjects' performance on the Powerful Others (P) - scale will be changed by Placebo Alpha Treatment. Through the use of the ANOVA, no significance was found on any of the treatment conditions at the specified level. All of the treatment conditions failed to meet the requirements for supporting the research hypothesis. Table 3 provides the display of this data.

TABLE 1

Subjects of Internal Group Presented by Treatment Group Providing the N-Size and Mean of Each Respective Group and Analysis of Variance Source Table and Areas of Significance for These Group Comparisons

Group	Size	Mean
1 - Alpha	29	*36.54+
2 - Placebo	12	40.25
3 - Alpha and Expectancy	11	*39.82
4 - Placebo and Expectancy	8	42.00+
5 - Expectancy	10	**42.30+
6 - Control	61	39.05

Analysis

Mean Square	D.F.	F-Ratio	P
52.48	5.	6.54	.0001

* companion study
** shared group
\+ Exceeded Dunnett's critical value of significance

TABLE 2

Subjects of Non-Internal Group Presented by Treatment Group Providing the N-Size and Mean of Each Respective Group and Analysis of Variance Source Table and Areas of Significance for These Group Comparisons

Group	Size	Mean
1 - Alpha	7	*28.57
2 - Placebo	8	27.38
3 - Alpha and Expectancy	9	*28.89
4 - Placebo and Expectancy	12	31.25
5 - Expectancy	10	**32.50
6 - Control	39	28.51

Analysis

Mean Square	D.F.	F-Ratio	P
41.41	5.	1.95	.0945

* companion study
** shared group

TABLE 3

Subjects of Powerful Other Group Presented by Treatment Group Providing the N-Size and Mean of Each Respective Group and Analysis of Variance Source Table and Areas of Significance for These Group Comparisons

Group	Size	Mean
1 - Alpha	9	*24.33
2 - Placebo	11	26.73
3 - Alpha and Expectancy	10	*25.00
4 - Placebo and Expectancy	12	26.33
5 - Expectancy	8	**26.50
6 - Control	48	26.27

Analysis

Mean Square	D.F.	F-Ratio	P
9.50	5.	.397	.850

* companion study
**shared group

Findings with Respect to the Fourth Hypothesis

It was stated in the fourth hypothesis that Non-Powerful Other subjects' performance on the P-scale will be changed by Placebo Alpha Treatment. Through the use of the ANOVA, no significance was found at the specified level indicating that the experimenter should accept the null hypothesis. Table 4 provides the data for this hypothesis.

Findings with Respect to the Fifth Hypothesis

It was stated in the fifth hypothesis that Chance subjects' performance on the C-scale will be changed by Placebo Alpha Treatment. Through the use of the ANOVA, no significance was found for any of the treatment conditions, indicating the experimenter should reject the research hypothesis. Table 5 provides the information of this scale.

Findings with Respect to the Sixth Hypothesis

It was stated in the sixth hypothesis that Non-Chance subjects' performance on the C-scale will be changed by Placebo Alpha Treatment. Through the use of the ANOVA, significance was found at the .028 level for the treatment conditions. Implementing Dunnett's multiple comparison procedure the minimum requirement for significance in this comparison is 2.57 which is computed at the .05 level of significance. Although this value was exceeded by : Alpha treatment of the companion study the

TABLE 4

Subjects of Non-Powerful Group Presented by Treatment Group Providing the N-Size and Mean of Each Respective Group and Analysis of Variance Source Table and Areas of Significance for These Group Comparisons

Group	Size	Mean
1 - Alpha	11	*12.55
2 - Placebo	9	11.66
3 - Alpha and Expectancy	10	*12.40
4 - Placebo and Expectancy	8	13.75
5 - Expectancy	12	**14.00
6 - Control	52	12.38

Analysis

Mean Square	D.F.	F-Ratio	P
8.93	5.	.389	.855

* companion study
**shared group

TABLE 5

Subjects of Chance Group Presented by Treatment Group Providing the N-Size and Mean of Each Respective Group and Analysis of Variance Source Table and Areas of Significance for These Group Comparisons

Group	Size	Mean
1 - Alpha	12	*22.83
2 - Placebo	10	21.30
3 - Alpha and Expectancy	8	*23.62
4 - Placebo and Expectancy	11	23.81
5 - Expectancy	9	**22.77
6 - Control	46	23.73

Analysis

Mean Square	D.F.	F-Ratio	P
11.54	5.	.496	.780

* companion study
**shared group

effectiveness of placebo alpha was not sufficient to achieve significant test findings. Thus, the null hypothesis was accepted. See Table 6 for results.

Findings with Respect to the Seventh Hypothesis

It was stated in the seventh hypothesis that Internal subjects' performance on the I-scale will be changed by Placebo Alpha Treatment + Expectancy. Through the use of the ANOVA, significance was found at the .0001 level of all treatment conditions. Dunnett's method found significance in treatment conditions: *Alpha - 2.90 Placebo + Expectancy - 2.78 and **Expectancy - 3.36. On the basis of this analysis the null hypothesis is rejected in favor of the research hypothesis. Table 1 provides the information used to gain these findings.

Findings with Respect to the Eighth Hypothesis

It was stated in the eighth hypothesis that Non-Internal subjects' performance on the I-scale will be changed by Placebo Alpha Treatment + Expectancy. Through the use of analysis of variance, no significance was found at the specified level indicating that the experimenter should accept the null hypothesis. Table 2 provides the data for the eighth hypothesis.

Findings with Respect to the Ninth Hypothesis

It was stated in the ninth hypothesis that Powerful Other subjects' performance on the P-scale will be changed by Placebo Alpha Treatment + Expectancy. Through the use

TABLE 6

Subjects of Non-Chance Group Presented by Treatment Group Providing the N-Size and Mean of Each Respective Group and Analysis of Variance Source Table and Areas of Significance for These Group Comparisons

Group	Size	Mean
1 - Alpha	8	*7.13+
2 - Placebo	10	8.50
3 - Alpha and Expectancy	12	*11.92
4 - Placebo and Expectancy	9	9.77
5 - Expectancy	11	**9.27
6 - Control	54	11.05

Analysis

Mean Square	D.F.	F-Ratio	P
37.86	5.	2.62	.028

* companion study
**shared group
+ Exceeded Dunnett's critical value of significance

of analysis of variance, no significance was found at the specified level indicating that the experimenter should accept the null hypothesis. Table 3 provides the data for the ninth hypothesis.

Findings with Respect to the Tenth Hypothesis

It was stated in the tenth hypothesis that Non-Powerful Other subjects' performance on the P-scale will be changed by Placebo Alpha Treatment + Expectancy. Through the use of analysis of variance, no significance was found at the specified level of significance, indicating that the experimenter should accept the null hypothesis. Table 4 provides the data for the tenth hypothesis.

Findings with Respect to the Eleventh Hypothesis

It was stated in the eleventh hypothesis that Chance subjects' performance on the C-scale will be changed by Placebo Alpha Treatment and Expectancy. Through the use of analysis of variance, no significance was found at the specified level indicating that the experimenter should accept the null hypothesis. Table 5 provides the data for the eleventh hypothesis.

Findings with Respect to the Twelfth Hypothesis

It was stated in the twelfth hypothesis that Non-Chance subjects' performance on the C-scale will be changed by Placebo Alpha Treatment + Expectancy. Through the use of analysis of variance, no significance was found at the

specified level indicating that the experimenter should accept the null hypothesis. Table 6 provides the data for the twelfth hypothesis.

Findings with Respect to the Thirteenth Hypothesis

It was stated in the thirteenth hypothesis that Internal subjects' performance on the I-scale will be changed by the Expectancy factor. Through the use of the ANOVA, significance was found at the .0001 level of all treatment conditions. Dunnett's method found significance in treatment conditions: Expectancy - 3.36 which exceeds the value set by Dunnett's 2.57, and supports the research hypothesis. Table 1 provides the data of this hypothesis.

Findings with Respect to the Fourteenth Hypothesis

It was stated in the fourteenth hypothesis that Non-Internal subjects' performance on the I-scale will be changed by the Expectancy factor. Through the use of analysis of variance, no significance was found at the specified level indicating that the experimenter should accept the null hypothesis. Table 2 provides the data for the fourteenth hypothesis.

Findings with Respect to the Fifteenth Hypothesis

It was stated in the fifteenth hypothesis that Powerful Other subjects' performance on the P-scale will be changed by the Expectancy factor. Through the use of analysis of variance, no significance was found at the

specified level indicating that the experimenter should accept the null hypothesis. Table 3 provides the data for the fifteenth hypothesis.

Findings with Respect to the Sixteenth Hypothesis

It was stated in the sixteenth hypothesis that Non-Powerful Other subjects' performance on the P-scale will be changed by the Expectancy factor. Through the use of analysis of variance, no significance was found at the specified level indicating that the experimenter should accept the null hypothesis. Table 4 provides the data for the sixteenth hypothesis.

Findings with Respect to the Seventeenth Hypothesis

It was stated in the seventeenth hypothesis that Chance subjects' performance on the C-scale will be changed by the Expectancy factor. Through the use of analysis of variance, no significance was found at the specified level indicating that the experimenter should accept the null hypothesis. Table 5 provides the data for the seventeenth hypothesis.

Findings with Respect to the Eighteenth Hypothesis

It was stated in the eighteenth hypothesis that Non-Chance subjects' performance on the C-scale will change by the Expectancy factor. Through the use of analysis of variance, no significance was found at the specified level indicating that the experimenter should accept the null hypothesis. Table 6 provides the data for the eighteenth

hypothesis.

Summary of Findings

Of the eighteen hypotheses tested, four produced significant results and one produced a trend. These four hypotheses will be discussed in more detail in the following section. The results may be represented by graphing the significance produced by each dependent variable.

As can be seen by the graph illustrated in Figure 1, non-internals are regressing towards the mean. Although a trend was produced in the expectancy condition (2.44 as compared to Dunnett's critical value of 2.57), this can be accounted for by the regression towards the mean phenomenon. The expectancy condition may also be a variable which tends to make people more internal. This finding is supported by the literature. Since expectancy is a result of the subjective probability held by the individual regarding the occurrence of reinforcement in a given situation (Rotter, Chance and Phares, 1972) the subjects in this group were given 10-15 days to learn their task. Within this span of time the subjects were unable to detect variance in their behavior which would confirm the existence of a change. Another factor which may have produced the trend in the expectancy condition on the Non-Internal scale is that of perceived locus of control.

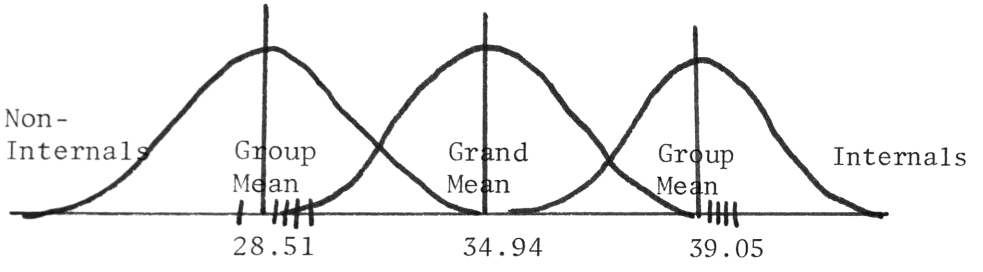

Figure 1

Graph showing the Internal group mean and the Non-Internal group mean in relationship to the grand mean.

+ shows the approximate location of subjects' score in regard to the group mean (above or below).

The locus of control in Non-Internals is established in either the Powerful Others or Chance scale. This means the individuals are likely to believe more strongly in the control held by Powerful Others or the effects of Chance. Even if these individuals noticed a change in their behavior, it may have been attributed to chance. Therefore, the results indicate that Non-Internals placed within an expectancy condition will tend to eventually regress towards the mean. Since no significance was found in any of the treatment conditions on the Non-Internals' performance on the I-scale, hypotheses two, eight, and fourteen were rejected.

Referring to Figure 1, significance of the Internal variable as computed using all treatment conditions revealed a probability of .0001 using analysis of variance. This probability was produced by the treatment conditions (using Dunnett's critical value of 2.57): *Alpha 2.90; placebo + expectancy 2.78 and expectancy alone 3.36. For a brief description of the alpha treatment condition and a report of the results see Appendix B.

Findings of the Seventh Hypothesis

The seventh hypothesis states that Internal subjects' performance on the I-scale will be changed by placebo alpha treatment + expectancy. As stated above, this critical level was exceeded and the acceptance of this hypothesis was

indicated. Referring to Figure 1, the movement of these Internal subjects is concentrated directly on the mean and above. The subjects believed they received feedback from their own body plus they received instructions from the experimenter. These subjects may have concentrated more on the instructions and the testing of those instructions which produced a significant change. This finding is supported by the literature which uses subjective measures to report their findings. In almost all cases reviewed (Grynol and Jamison, 1975; Valins, 1966; Barefoot and Straub, 1971) the placebo effect produced significant results. By using the added factor of expectancy, the experimenter confirmed any preconceived ideas the subject held concerning biofeedback and his ability to control.

This finding may also bring question to the statement made by Crowne and Liverant (1963) that internals like to be in control of the situation and are therefore likely to act in the opposite manner than is expected. Had this been the case, these internal subjects' performance would have been in the direction towards the mean. Since the movement was away from the group mean, the expectancy statement served to confirm their own beliefs (that they have self-control) and increase the probability of reporting their attitudes as changed.

Findings of the Thirteenth Hypothesis

It was stated in the thirteenth hypothesis that Internal subjects' performance on the I-scale will be changed by the expectancy factor. This hypothesis was supported by using Dunnett's multiple comparisons (critical value 2.57; expectancy condition 3.36). This effect may be explained through the use of the time span experienced by the expectancy group. Since a period of 10-15 days was used, the Internals had more time to learn their task. Since characteristics of Internals include knowledge seeking, higher self-concept and a tendency to show more effort in controlling their impulses, changes which occurred over the specified time period could be attributed to their ability to control themselves. With this possible increased perception of increased control, their scores varied and produced significance.

Figure 2 represents the Powerful Others and the Non-Powerful Others scale and the relationship of the subjects' performance (above or below) the group mean. As can be seen in Figure 2, no significant results were obtained on this scale by any of the treatment conditions. This can be explained by the regression towards the mean tendency. Since Non-Powerful Other subjects are probably based within the Internal or Chance locus of control, the subjects in all treatment conditions may have believed any

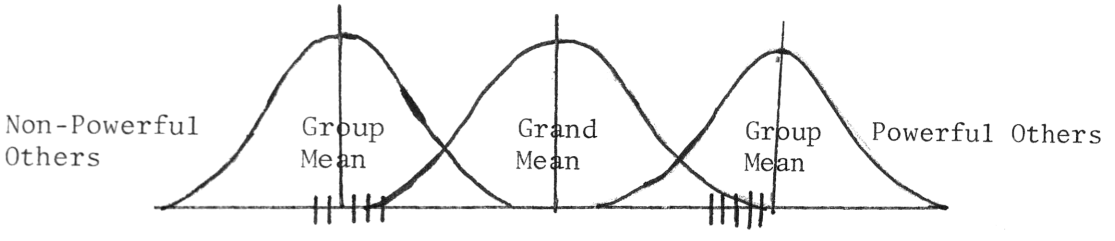

Figure 2

Graph showing the Powerful Others group mean and the Non-Powerful Others group mean in relationship to the grand mean.

+ shows the approximate location of subjects' score in regard to the group mean (above or below).

change could have occurred by chance. Those in the Powerful Other range may have believed they had no control over the situation or the changes could have occurred by chance. Since none of the treatment conditions varied, hypotheses three, four, nine, ten, fifteen, and sixteen were not supported.

Figure 3 shows the relationship of the different treatment conditions to the Chance scale (either above or below the group mean). Significance was found on the Non-Chance scale in the treatment condition of alpha. For a brief description of the alpha treatment condition and the results it had on this scale, refer to Appendix B.

Other than this finding, no treatment condition exceeded the critical value needed for significance. Therefore, hypotheses five, six, eleven, twelve, seventeen and eighteen were not supported.

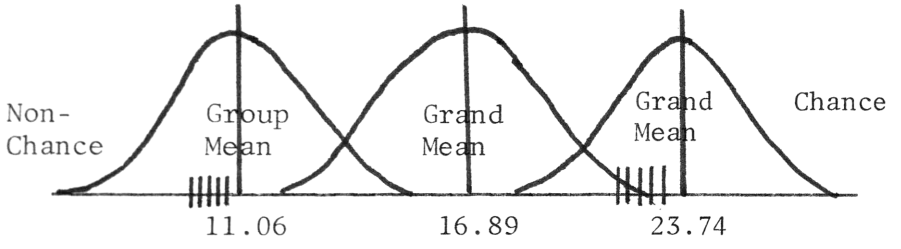

Figure 3

Graph showing the Chance group mean and the Non-Chance group mean in relationship to the grand mean

+ shows the approximate location of subjects' score in regard to the group mean (above or below).

CHAPTER V

SUMMARY AND CONCLUSIONS

The purpose of Chapter I was to present sociological explanations of crime which dealt primarily in explaining collective behavior. The theories, being the structural theory and the differential association theory. The social learning theory was presented as a possible basis of treatment. By combining a sociological theory and a treatment basis, it may be possible to treat people as a group rather than one individual. Comparisons were then made of the structural and differential association theory to the social learning theory.

Chapter II dealt with the review of literature on the areas of biofeedback, locus of control, placebo and expectancy. Each area was presented, along with several studies exemplifing each area. A statement regarding the need to study the placebo and expectancy effects was made and the intention of the study was stated.

Chapter III was concerned with the methodology utilized in the present study. Specifics regarding the determination of sample, sample size, instrumentation, and ultimate design, and statistical tests to be utilized in analysis, were described.

Chapter IV presented the results obtained from the eighteen hypotheses. Explanations regarding significant

findings as well as non-significant findings were discussed.

Suggestions for Future Research

Future research should be designed to include only External people (ex. Levenson's scale: Powerful Other and Chance subjects). These people seem to be most influenced by the treatment setting and the experiment. Since many of the inmates are external, research should be done in the area of corrections. Variations should be made to include a larger more external sample, longer treatment sessions and personal interviews to fully understand the change that is taking place in these individuals. The placebo + expectancy factor as well as the expectancy factor alone play an important part in the treatment setting and biofeedback is no exception. It is hoped further research is done in this area to prevent disappointments in biofeedback treatment conditions.

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APPENDIXES

APPENDIX A

Levenson's and the Fifty Questions from the MMPI and the Reliability and Validity Figures

APPENDIX A

Levenson's and the Fifty Questions from the MMPI and the Reliability and Validity Figures

		Strongly Disagree	Disagree Somewhat	Slightly Disagree	Slightly Agree	Agree Somewhat	Strongly Agree
		-3	-2	-1	+1	+2	+3
1.	I like mechanics magazines.	-3	-2	-1	+1	+2	+3
2.	I think I would like the work of a librarian.	-3	-2	-1	+1	+2	+3
3.	Whether or not I get to be a leader depends mostly on my ability.	-3	-2	-1	+1	+2	+3
4.	When I take a new job, I like to be tipped off on who should be gotten next to.	-3	-2	-1	+1	+2	+3
5.	I would like to be a singer.	-3	-2	-1	+1	+2	+3
6.	To a great extent my life is controlled by accidental happenings.	-3	-2	-1	+1	+2	+3
7.	I feel that it is certainly best to keep my mouth shut when I'm in trouble.	-3	-2	-1	+1	+2	+3
8.	I am very strongly attracted by members of my own sex.	-3	-2	-1	+1	+2	+3
9.	I feel like what happens in my life is mostly determined by powerful people.	-3	-2	-1	+1	+2	+3
10.	I used to like drop-the-handkerchief.	-3	-2	-1	+1	+2	+3
11.	When someone does me wrong I feel I should pay him back if I can, just for the principle of the thing.	-3	-2	-1	+1	+2	+3
12.	Whether or not I get into a car accident depends mostly on how good a driver I am.	-3	-2	-1	+1	+2	+3
13.	I have often wished I were a girl. (Or if you are a girl) I have never been sorry that I am a girl.	-3	-2	-1	+1	+2	+3

APPENDIX A--Continued

		Strongly Disagree	Disagree Somewhat	Slightly Disagree	Slightly Agree	Agree Somewhat	Strongly Agree
14.	My feelings are not hurt easily.	-3	-2	-1	+1	+2	+3
15.	When I make plans, I am almost certain to make them work.	-3	-2	-1	+1	+2	+3
16.	I enjoy reading love stories.	-3	-2	-1	+1	+2	+3
17.	I sometimes tease animals.	-3	-2	-1	+1	+2	+3
18.	Often there is no chance of protecting my personal interest from bad luck happenings.	-3	-2	-1	+1	+2	+3
19.	I like poetry.	-3	-2	-1	+1	+2	+3
20.	I think I would like the type of work a forest ranger does.	-3	-2	-1	+1	+2	+3
21.	When I get what I want, it's usually because I'm lucky.	-3	-2	-1	+1	+2	+3
22.	I would like to be a florist.	-3	-2	-1	+1	+2	+3
23.	It takes a lot of argument to convince most people of the truth.	-3	-2	-1	+1	+2	+3
24.	Although I might have good ability, I will not be given leadership responsibility without appealing to those in positions of power.	-3	-2	-1	+1	+2	+3
25.	I would like to be a nurse.	-3	-2	-1	+1	+2	+3
26.	I like to go to parties and other affairs where there is lots of loud fun.	-3	-2	-1	+1	+2	+3
27.	How many friends I have depends on how nice a person I am.	-3	-2	-1	+1	+2	+3
28.	I frequently find it necessary to stand up for what I think is right.	-3	-2	-1	+1	+2	+3
29.	I like dramatics.	-3	-2	-1	+1	+2	+3

APPENDIX A--Continued

	Strongly Disagree	Disagree Somewhat	Slightly Disagree	Slightly Agree	Agree Somewhat	Strongly Agree
30. I have often found that what is going to happen will happen.	-3	-2	-1	+1	+2	+3
31. I believe in a life here-after.	-3	-2	-1	+1	+2	+3
32. I like collecting flowers or growing house plants.	-3	-2	-1	+1	+2	+3
33. My life is chiefly controlled by powerful others.	-3	-2	-1	+1	+2	+3
34. I enjoy a race or game better when I bet on it.	-3	-2	-1	+1	+2	+3
35. I have never indulged in any unusual sex practices.	-3	-2	-1	+1	+2	+3
36. Whether or not I get into a car accident is mostly a matter of luck.	-3	-2	-1	+1	+2	+3
37. Most people are honest, chiefly through fear of being caught.	-3	-2	-1	+1	+2	+3
38. At times my thoughts have raced ahead faster than I could speak them.	-3	-2	-1	+1	+2	+3
39. People like myself have very little chance of protecting our personal interests when they conflict with those of strong pressure groups.	-3	-2	-1	+1	+2	+3
40. I like to cook.	-3	-2	-1	+1	+2	+3
41. My table manners are not quite as good at home as when I am out in company.	-3	-2	-1	+1	+2	+3
42. It's not always wise for me to plan too far ahead because many things turn out to be a matter of good or bad fortune.	-3	-2	-1	+1	+2	+3
43. I used to keep a diary.	-3	-2	-1	+1	+2	+3

APPENDIX A--Continued

		Strongly Disagree	Disagree Somewhat	Slightly Disagree	Slightly Agree	Agree Somewhat	Strongly Agree
44.	I am worried about sex matters.	-3	-2	-1	+1	+2	+3
45.	Getting what I want requires pleasing those people above me.	-3	-2	-1	+1	+2	+3
46.	My hands have not become clumsy or awkward.	-3	-2	-1	+1	+2	+3
47.	I would like to be a soldier.	-3	-2	-1	+1	+2	+3
48.	Whether or not I get to be a leader depends on whether I'm lucky enough to be in the right place at the right time.	-3	-2	-1	+1	+2	+3
49.	I do not have a great fear of snakes.	-3	-2	-1	+1	+2	+3
50.	If I were a reporter I would very much like to report news of the theater.	-3	-2	-1	+1	+2	+3
51.	If important people were to decide they didn't like me, I probably wouldn't make many friends.	-3	-2	-1	+1	+2	+3
52.	I daydream very little.	-3	-2	-1	+1	+2	+3
53.	I would like to be a journalist.	-3	-2	-1	+1	+2	+3
54.	I can pretty much determine what will happen in my life.	-3	-2	-1	+1	+2	+3
55.	In walking I am very careful to step over sidewalk cracks.	-3	-2	-1	+1	+2	+3
56.	I frequently find myself worrying about something.	-3	-2	-1	+1	+2	+3
57.	I am usually able to protect my personal interests.	-3	-2	-1	+1	+2	+3
58.	I have never had any breaking out on my skin that has worried me.	-3	-2	-1	+1	+2	+3

APPENDIX A--Continued

		Strongly Disagree	Disagree Somewhat	Slightly Disagree	Slightly Agree	Agree Somewhat	Strongly Agree
59.	Some of my family have habits that bother and annoy me very much.	-3	-2	-1	+1	+2	+3
60.	Whether or not I get into a car accident depends mostly on the other driver.	-3	-2	-1	+1	+2	+3
61.	I like to talk about sex.	-3	-2	-1	+1	+2	+3
62.	I think I would like the work of a building contractor.	-3	-2	-1	+1	+2	+3
63.	When I get what I want, it's usually because I worked hard for it,	-3	-2	-1	+1	+2	+3
64.	I have been disappointed in love.	-3	-2	-1	+1	+2	+3
65.	If I were an artist I would like to draw flowers.	-3	-2	-1	+1	+2	+3
66.	In order to have my plans work, I make sure that they fit in with the desires of people who have power over me.	-3	-2	-1	+1	+2	+3
67.	I like science.	-3	-2	-1	+1	+2	+3
68.	I have often felt that strangers were looking at me critically.	-3	-2	-1	+1	+2	+3
69.	My life is determined by my own actions.	-3	-2	-1	+1	+2	+3
70.	I very much like hunting.	-3	-2	-1	+1	+2	+3
71.	Once in a while I feel hate toward members of my family whom I usually love.	-3	-2	-1	+1	+2	+3
72.	It's chiefly a matter of fate whether or not I have a few friends or many friends.	-3	-2	-1	+1	+2	+3
73.	I should like to belong to several clubs or lodges.	-3	-2	-1	+1	+2	+3
74.	I liked "Alice in Wonderland" by Lewis Carroll.	-3	-2	-1	+1	+2	+3

APPENDIX A--Continued

RELIABILITY AND VALIDITY

KUDER-RICHARDSON	INTERNAL	POWERFUL OTHERS	CHANGE
(student group)	r = .64	r = .77	r = .78

SPEARMAN-BROWN	INTERNAL	POWERFUL OTHERS	CHANGE
(adult group)	r = .62	r = .66	r = .64

APPENDIX A--Continued

Answer Sheet

1.	-3	-2	-1	+1	+2	+3
2.	-3	-2	-1	+1	+2	+3
(I)3.	-3	-2	-1	+1	+2	+3
4.	-3	-2	-1	+1	+2	+3
5.	-3	-2	-1	+1	+2	+3
(C)6.	-3	-2	-1	+1	+2	+3
7.	-3	-2	-1	+1	+2	+3
8.	-3	-2	-1	+1	+2	+3
(P)9.	-3	-2	-1	+1	+2	+3
10.	-3	-2	-1	+1	+2	+3
11.	-3	-2	-1	+1	+2	+3
(P)12.	-3	-2	-1	+1	+2	+3
13.	-3	-2	-1	+1	+2	+3
14.	-3	-2	-1	+1	+2	+3
(I)15.	-3	-2	-1	+1	+2	+3
16.	-3	-2	-1	+1	+2	+3
17.	-3	-2	-1	+1	+2	+3
(C)18.	-3	-2	-1	+1	+2	+3
19.	-3	-2	-1	+1	+2	+3
20.	-3	-2	-1	+1	+2	+3
(C)21.	-3	-2	-1	+1	+2	+3
22.	-3	-2	-1	+1	+2	+3
23.	-3	-2	-1	+1	+2	+3
(P)24.	-3	-2	-1	+1	+2	+3
25.	-3	-2	-1	+1	+2	+3
26.	-3	-2	-1	+1	+2	+3
(I)27.	-3	-2	-1	+1	+2	+3
28.	-3	-2	-1	+1	+2	+3
29.	-3	-2	-1	+1	+2	+3
(C)30.	-3	-2	-1	+1	+2	+3
31.	-3	-2	-1	+1	+2	+3
32.	-3	-2	-1	+1	+2	+3
(P)33.	-3	-2	-1	+1	+2	+3
34.	-3	-2	-1	+1	+2	+3
35.	-3	-2	-1	+1	+2	+3
(C)36.	-3	-2	-1	+1	+2	+3
37.	-3	-2	-1	+1	+2	+3
38.	-3	-2	-1	+1	+2	+3
(P)39.	-3	-2	-1	+1	+2	+3
40.	-3	-2	-1	+1	+2	+3
41.	-3	-2	-1	+1	+2	+3
(C)42.	-3	-2	-1	+1	+2	+3
43.	-3	-2	-1	+1	+2	+3
44.	-3	-2	-1	+1	+2	+3
(P)45.	-3	-2	-1	+1	+2	+3
46.	-3	-2	-1	+1	+2	+3
47.	-3	-2	-1	+1	+2	+3
(C)48.	-3	-2	-1	+1	+2	+3
49.	-3	-2	-1	+1	+2	+3
50.	-3	-2	-1	+1	+2	+3
(P)51.	-3	-2	-1	+1	+2	+3
52.	-3	-2	-1	+1	+2	+3
53.	-3	-2	-1	+1	+2	+3
(I)54.	-3	-2	-1	+1	+2	+3
55.	-3	-2	-1	+1	+2	+3
56.	-3	-2	-1	+1	+2	+3
(I)57.	-3	-2	-1	+1	+2	+3
58.	-3	-2	-1	+1	+2	+3
59.	-3	-2	-1	+1	+2	+3
(P)60.	-3	-2	-1	+1	+2	+3
61.	-3	-2	-1	+1	+2	+3
62.	-3	-2	-1	+1	+2	+3
(I)63.	-3	-2	-1	+1	+2	+3
64.	-3	-2	-1	+1	+2	+3
65.	-3	-2	-1	+1	+2	+3
(P)66.	-3	-2	-1	+1	+2	+3
67.	-3	-2	-1	+1	+2	+3
68.	-3	-2	-1	+1	+2	+3

APPENDIX A--Continued

(I)69. -3 -2 -1 +1 +2 +3

70. -3 -2 -1 +1 +2 +3

71. -3 -2 -1 +1 +2 +3

(C)72. -3 -2 -1 +1 +2 +3

73. -3 -2 -1 +1 +2 +3

74. -3 -2 -1 +1 +2 +3

APPENDIX B

Description of Treatment Conditions in Companion Study

APPENDIX B

Description of Treatment Conditions in Companion Study

Alpha biofeedback treatment is defined as: electroencephelographic monitering of a brain wave pattern which is in the frequency range of eight to thirteen cycles per second. An amplitude of ten microvolts was used as the strength setting. Feedback of the brain wave detections was accomplished through the use of headphones.

Alpha biofeedback and Expectancy treatment is defined as: Alpha biofeedback treatment coupled with experimenter communicated expectancy. Expectancy involves instructions to the subject concerning that subjects' power of self-control. In this study, the subject was told that he was going through a period of increased self-control.

Methods

Student volunteers were solicited to take Levenson's Multidimensional Locus of Control scales as a pretest. Those who received treatment and completed the study had scores within two standard deviations of the mean on the adult scale as defined by Levenson (1972).

The Alpha group alone and the Alpha + Expectancy group received treatment within ten to fifteen days after the pretest with the posttest immediately following the treatment. The Expectancy group received instructions (treatment) immediately after the tabulations of the pretest scores

APPENDIX B--Continued

and randomization to groups. The posttest was administered following a period of ten to fifteen days from the date of instructions.

Vita was removed during scanning