

CONCEPT CONDITIONING IN THE HUMAN ORGANISM:
THE EFFECTS OF POSITIVE AND NEGATIVE
REINFORCEMENT AND THE SEX OF THE
EXPERIMENTER

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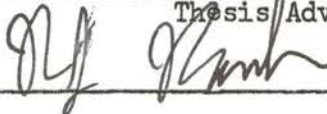
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CHAPTER I

THE PROBLEM

Purpose of the Study

The purpose of the present study was threefold: (1) as a partial replication of the Aldrich study conducted at Oklahoma State University in 1962 which successfully conditioned words which could have either a concrete or an abstract meaning to an arbitrarily defined category by positive, undetected, verbal reinforcement in the form of "mm-hum" or "that's good," (2) to test the effect of negative undetected reinforcement in the form of "huh-uh" or "no" on the conditioning of an arbitrarily selected category, and (3) to test the effect of differences between male and female experimenters in each condition.

Aldrich, (1962) found that positive reinforcement could result in the subjects' perceptually learning a frame-of-reference from which meaningful structuring of an ambiguous stimulus could be interpreted.

The question of what effect negative undetected verbal reinforcement would have on the interpretation of ambiguous stimuli is of interest in that it is a method commonly employed in parent-child and teacher-pupil interaction under the assumption that the negative reinforcement, without additional components, is sufficient for directing behavior. The isolated check mark used in grading tests or daily work is an

example of such a method.

A study conducted by the present investigator in the summer of 1964 in which both positive and negative reinforcement were used in an attempt to condition a frame-of-reference suggested the possibility that the sex of the experimenter may be a significant variable.

The question to be investigated in the present study was: To what degree, if any, is it possible to instrumentally condition a frame-of-reference from which the stimuli presented would be interpreted in the reinforced direction.

According to Sherif and Sherif (1956) it is the function of the frame-of-reference to meaningfully structure percepts in that the percept is interpreted in accordance with whatever frame-of-reference exists in the cognitive field. They clarify their conception of frame-of-reference in the following way:

When individuals perceive an event (such as the movement of a stationary light in a darkroom) which lack any other standard of comparison, they subjectively establish a range of extent and a point (a standard or norm) within that range which is peculiar to the individual. The subjectively established norm serves as a reference point with which each successive experiment is compared and judged to be short, long, medium--within the range peculiar to the subject. (Solley and Murphy, 1960, p. 86)

Hence, when a stimulus is presented, its perceptual structuring is determined by the frame-of-reference present at the time.

The method used to condition the frame-of-reference is through the use of generalized conditioned reinforcers. Skinner (1957) suggests that rather than training a stimulus to a great variety of reinforcements, one can for the purposes of analysis, arrange a contingency between a verbal response and a generalized reinforcer. Then a response trained in this manner has dynamic properties similar to those which

it would have acquired had it been followed by all the specific reinforcers at issue. In Skinnerian terms, the effect of verbal conditioning is the releasing of a response through the arrangement of such a contingency. A common generalized conditioned reinforcer is "approval" or "disapproval." Sometimes these reinforcers have a verbal form "mm-hum" or "good" or "wrong" or "huh-uh."

The present study was designed to get subjects to assign ambiguous stimuli in the form of homonyms to a concrete category by way of undetected verbal reinforcement. Positive verbal reinforcement in this study was defined as spoken approval by the experimenter in the form of "good" or "mm-hum" following the selection of a word with concrete meaning in a two-choice situation. The selection was preceded by a stimulus word (homonym) which could be interpreted as either concrete or abstract. Negative reinforcement was defined as verbal disapproval in the form of "huh-uh" or "no" by the experimenter of a word with abstract meaning in the two-choice situation.

The term "undetected" was defined for the purpose of this study as the lack of awareness on the part of the subject as to the purpose of the experiment or the contingency between the response and the reinforcement.

It was expected that through this procedure a frame-of-reference could be conditioned from which the ambiguous stimuli would be interpreted in a concrete fashion.

Theoretical Considerations

The theoretical background underlying the rationale of the effect of undetected verbal reinforcement on the conditioning of a frame-of-

reference is based on the dynamic interaction between the effects of learning on perception and the effects of perception on learning. These are further modified by the environment in producing behavior. The theoretical position of the present study assumes a perceptual learning point of view as described by Solley and Murphy (1960). The dynamic interaction of these variables follows the postulates of Sherif and Sherif (1956). Both learning and perception are inferred processes.

Perception, which concerns the experience of present objects and events refers to both a process and a product. We call the process perceiving and the product a percept. The consequence of a perceptual act is a percept. Although we do not know the necessary and sufficient conditions for inferring perception, some of the more important conditions have been outlined. Among these are sensory stimulation and excitation of some receptors.

According to Solley and Murphy (1960) perception as a process consists of a series of interdependent subprocesses or stages which can be partially ordered in their succession. The first stage is preparatory in nature and consists of "sets" or "hypotheses" of the individual which exist prior to proximal stimulation. The second stage involves the activities which prepare the organism for receiving stimuli. In large part, through conditioning, the organism learns to attend to some stimuli and not to others. The third stage is the sensory reception stage which involves the interplay of reception and projection area functions. The fourth is a trial and check stage. The main observable feature of this phase is a short but measurable time lag between reception and final percept. In addition, it is at this stage that autonomic activity is triggered which feeds back into the

perceptual process. Hypotheses are sometimes tested in this stage. Trial and check may also involve further search for information from the environment. The fifth stage of the perceptual process as Solley and Murphy (1960) conceive it, is the consolidation of stimulus traces. More probably, a "sample" of stimulus traces is consolidated into a percept or final perceptual organization.

A percept then is an event which is experienced and which restructures the perceived environment. In fact, Solley and Murphy (1960) consider it convenient to define perception as the structuring of stimulation.

In summary, the molar events of the perceptual act are: (a) perceptual expectancy, (b) attending, (c) reception, (d) trial-and-check, and (e) final perceptual organization. These events then lead to behavioral or cognitive events.

Perception appears to depend upon both the nature of the stimulus field and learning. According to Sherif and Sherif (1956), behavior and experience constitute a unity. What we attend to at a given time is jointly determined by external and internal factors. Experience always seems to be selective. When the stimulus field has a definite pattern, the structure of perception corresponds to it rather closely. Structured stimulus situations set limits to alternatives in psychological structuring. When some items in the stimulus field are similar and some dissimilar, those which are similar will tend to be grouped.

Those items closer to each other will tend to be grouped together. Objects bound together with sharply defined boundaries are likely to be perceived as perceptual units. The factor of closed form dominates

over proximity as does good continuity of contours. These objective factors may be mutually supporting or destructive. Further, the objective properties of stimulus situations limit the possible alternatives in experiencing them.

Hilgard (1956) defines learning as the process by which an activity originates or is changed through reacting to an encountered situation, provided that the characteristics of the change in activity cannot be explained on the basis of native response tendencies, maturation, or temporary states of the organism. Learning is an inferred process, the inference to be drawn only when certain conditions are met. The activities which become altered need not be directly observed, but they must be logically linked to things which can be directly observed. Hence an instrumental act restructures the physical environment just as a perceptual act restructures the perceived environment. According to Solley and Murphy (1960):

Perceptual learning, then, is a change in the status of a logically inferred perceptual state or process as a result of successively applied operations of a learning paradigm.

We have said that the effect of structured situations is to limit alternatives in psychological structuring. It follows, then, that unstructured stimulus situations increase alternatives in psychological structuring. Further, as stimulus situations become more unstructured, the relative contribution of internal factors (motives, emotions, attitudes, identifications of the person, and other products of past learning) to the ensuing psychological structure becomes greater. These internal factors are inferred from behavior. The more unstructured the stimulus situation, the greater will be the effect of stimulating

objects and events outside the individual. Psychological structuring is jointly determined by external and internal factors. According to Sherif (1956), the psychological tendency is toward the structuring of experience. Further, behavior follows central psychological structuring. This is to say that behavior follows the central organization of both internal and external factors rather than being determined solely by either.

Sherif proposes that various factors in the frame-of-reference have differing relative weights. Frame-of-reference is defined as the functionally interrelated external and internal factors operating at a given time. Hence psychological structuring is a function of the interrelationship between persons, events or objects (external factors) on the one hand and motives, attitudes, emotions, and the like, on the other. These factors do not contribute equally; rather their influence is in part determined by the extent to which the stimulus situation is structured.

Psychological or perceptual structuring is selective. Out of the hundreds of well-structured stimuli available to the organism at a given time, only a small portion are perceived during a given time. What stands out is termed "figure," i.e., objects or persons which constitute clearly defined or organized perceptual units, and the remainder of the stimulus field is called "ground" or background. Certain factors operate as limiting influences in determining the main character of the structure. These limiting, weighty factors, which can be either internal or external or both, are referred to by Sherif as the main "anchorages" in the frame-of-reference. They are the reference points in the patterning of experience and behavior,

that is, the percepts we know most about. Loss of stable anchorage results in anxiety as does conflict among anchorages.

The mechanism of reinforcement accepted for this study is in the Guthrie-Skinner-Estes tradition, namely, the concept of reinforcement stimulus as one which preserves some act and by so preserving alters the probability of that act's occurring again. (Solley and Murphy, 1960)

At the present time there is no general agreement among theorists as to what property of reinforcement is central in determining the resultant behavior.

According to Kimble (1961), a positive reinforcer, such as food, strengthens an association between a stimulus and a response by virtue of its presentation. A negative reinforcer, such as a puff of air or an electric shock, strengthens an association by its termination. Both negative and positive reinforcers can function in instrumental as well as classical conditioning situations.

Skinner, according to Hilgard (1956), points out that for reflexes the reinforcer is an unconditioned stimulus (UCS), whereas for operants it is reward, or in Thorndikian terms, satisfiers. Although he is largely concerned with positive reinforcers, he also recognizes the existence of negative reinforcers. For him, negative reinforcers are aversive stimuli, ones that the individual commonly seeks to avoid. Whereas reinforcement results from the occurrence of a positive reinforcer, it results from the termination of a negative reinforcer. Hence electric shock is a negative reinforcer because the termination of the shock is reinforcing. A response can be reinforced either by presenting a positive reinforcer or by removing a negative reinforcer.

For the purpose of this study reinforcers are defined in this manner.

While a negative reinforcer is defined as an event or a stimulus which when removed from a situation strengthens the probability of the occurrence of an operant, the methodology used in connection with aversive stimuli resembles the punishment training procedure. In punishment training a response is made which is then followed by a noxious stimulus. This procedure consists of making the occurrence of some noxious stimulus contingent on the occurrence of a specified response. Note that the noxious stimulus comes after the response. The response which is punished is well specified, but just what the organism is to do is left ambiguous. In the present experiment, it is expected that through the use of negative verbal reinforcement contingent with the selection of words with abstract meaning, the subjects will increase their choice of words with concrete meanings.

The effect of reinforcement, as Dollard and Miller (1950) have proposed, can be direct, automatic and unconscious. Greenspoon's study (1955) supports this proposal. It is within these boundary conditions that the present study is conducted. The weaker law of effect is evoked as stated by Meehl (1950), namely, reinforcers are defined as those events which have been found experimentally to be reinforcing. A general class of reinforcers is "approval" or "disapproval."

In summary, the theoretical formulations of the present study follow the perceptual learning point of view as conceptualized by Solley and Murphy and the process by which the various factors dynamically interact to produce the responses follow the postulates as described by Sherif. The effect of reinforcement acting in a direct, automatic and unconscious manner follow the formulation of Miller and Dollard.

Review of the Literature

Many studies have been designed to investigate whether or not words can be used as reinforcers. In addition, many of these studies have attempted to investigate whether or not the effect of the reinforcement procedure occurred without the awareness of the subject. Although the studies do not lend themselves to well-defined categorization regarding these variables, the review of the literature will, in general, consider studies involving positive and negative reinforcement, the problem of awareness, and the experimenter variable.

Positive and Negative Verbal Reinforcement

Thorndike was one of the earliest investigators of the effects of verbal reinforcement. It was evident from The Fundamentals of Learning published in 1932, that the strengthening of connections via their satisfying aftereffects could be accomplished without the subject being aware of what the connection was. This phenomenon, so important for learning in the sphere of emotions, attitudes, etc., was tested by Thorndike and Rock (1935) in an "intellectual" area.

Subjects were instructed to free associate to stimulus words. Associations due to sequential connections used in writing and speaking were rewarded by the experimenter's saying "right." Examples of such connections are across--street, yours--truly, etc. Associations due to connections used in getting the word's meaning were punished by the announcement of the word "wrong." Examples are up--down, get--obtain, etc. Money bonuses were also given or deducted.

Clearly the results of the experiment indicated that there was learning taking place. Thorndike notes, however, that there was great

variability among individuals in the amount of strengthening of the rewarded tendency. Nearly one-fourth of the persons probably did not learn at all. He also noted certain over-complications of the procedure by irrelevant emotional or intellectual attitudes of the subjects, i.e., trying to make a good impression on the experimenter or to appear intelligent or to solve some system which they imagined back of the choice of "right" or "wrong."

Thorndike (1935) successfully conditioned subjects to respond selectively to attributes of Christmas cards through positive verbal reinforcement. Both Thorndike (1935) and Philbrick and Postman (1955) conditioned numbers in response to stimulus words. In the later study, subjects were instructed to respond to each word in a series with a number from one to nine. The number, rewarded by the experimenter's announcing "right," was the number of letters in the word minus one. All other responses were called "wrong." Results of the experiment indicated that significant learning took place prior to verbalization of the principle. It was their contention that learning occurred without awareness. About 20 of the subjects were able to verbalize the principle and about 28 were not. Both groups learned, but the later groups' performance was poorer.

Greenspoon (1955) was able to increase or decrease significantly the frequency of plural nouns by presenting one of two stimuli, "mm-hum" or "huh-uh" after one of the two responses, either plural nouns or any word not a plural noun. In a control group, no stimulus was introduced following the response.

Although "mm-hum" is a commonly used verbal reinforcer, ambiguous results have obtained from its use. Mandler and Kaplan (1956) used

"mm-hum" to reinforce plural nouns and found upon questioning that those subjects who interpreted the "mm-hum" as an incentive to go on increased their frequency of plural nouns but those who interpreted it as an indication that they were saying the wrong thing showed a decrease in plural nouns.

Hildum and Brown (1956) found "mm-hum" ineffective for modifying the response class of opinion statements which could be modified by the reinforcement "good." In this experiment, telephone conversations were used and apparently "mm-hum" was used as a discriminative stimulus for the presence of a listening person.

The reinforcement "good" has been used in a number of experiments. Essman (1956) conditioned subjects to respond to nonsense inkblots with human or anatomical responses by reinforcing these responses with "good." McNair (1957) increased rate of verbal responding by sounding a buzzer which subjects had been instructed meant "good." Nuthmann (1957) was successful in conditioning response statements of self-acceptance with "good" as a reinforcer by using items in a questionnaire which could be answered only by "right" or "wrong." However he was unsuccessful in using the presentation of a light. Wilson and Verplanck (1956) were able to significantly increase the rate of both plural nouns and adverbs through the use of "good" as a reinforcer. Ball (1952) instructed subjects to make up a story which included an animal, a man and a woman. The experimenter then selectively conditioned one of these responses.

A few experimenters have investigated characteristics of the subjects as they affect verbal conditioning. Taffel (1955) found that only individuals with high or medium amounts of anxiety showed verbal

conditioning, with the high anxiety subjects conditioning more than the medium anxiety subjects. It appears that anxious individuals behave as if they had been deprived of social reinforcement.

Ganzer and Sarason (1964) tested the effects of positively reinforcing negative self-ratings of hostile vs. non-hostile experimenters in relation to hostile vs. non-hostile subjects. They found that the reinforcement was effective in maintaining rather than increasing the operant rate. Whereas low hostile groups showed increased negative self-ratings for the last twenty minutes as compared with the ten-minute operant period, high hostility reinforced subjects did not.

Salzinger, et al. (1964) were successful in obtaining continuous speech in schizophrenic patients by first responding by positive verbal reinforcement to questions of age, marital status, etc. The subjects were instructed to talk about themselves. A light flashed on when self-referred afferent statements were made for one group and the light flashed every thirty seconds for another group for continuous speech.

There has been relatively little research in the use of punishment using the verbal conditioning paradigm. The use of electric shock used as punishing stimuli has been reported for a number of years. Thorndike used "wrong" as a punishing stimulus but in conjunction with "right" which tended to confuse the results. Greenspoon (1951) found that "huh-uh" following responses of a narrow response class, such as plural nouns decreased the frequency of responses. However, when the same stimulus was introduced following members of a broader response class, such as non-plural noun responses, there was a tendency for the frequency of the response to rise. Kirman (1958) also reported a decrement in the frequency of responses that was followed with the verbal stimuli,

"not so good." Walder (1959) examined the effects of discontinuing punishment in the form of "wrong" for 200 trials after subjects had learned to respond to certain critical numbers with the word "orange" at a 35 percent increase over the operant level. That is, during training, if the subject did not respond with the word "orange" to these critical numbers, he was punished by the announcement of "wrong." Results indicated that the discontinuance of the punishment seemed to decrease the frequency of previously non-punished responses but not to the operant level.

The effect on the speaker of positive and negative reinforcement from the audience was tested by Sabin and Allen (1964). Subjects ranking high or low in need for social approval were asked to play a role espousing an attitude quite different from the one they held. They were instructed to try to convince the audience of the position they had taken. For some subjects, the audience was instructed to respond with positive reinforcement such as alertness and undivided attention, nodding their head in agreement with certain points he was making, etc. In the negative reinforcement condition, the audience averted the eyes of the speaker, looked down at the desk instead of at the speaker, shook their heads slowly in disagreement, etc. Two control samples were used, one receiving the same instructions as the experimental group, another simply filling out the attitude scale twice. The results indicated that subjects perceived negative reinforcement significantly more often than subjects in the positive reinforcement condition. Playing the role resulted in attitude change and the group experiencing negative reinforcement from the audience resulted in slightly greater attitude change than those in the positive reinforcement condition.

Buss and Buss (1956) report the results of using different combinations of negative and positive reinforcement. The combinations used were: the experimenter said "right" for a correct response, "wrong" for an incorrect response (Right-Wrong); nothing for a correct response, "wrong" for an incorrect response (Nothing-Wrong); and "right" for a correct response, nothing for an incorrect response (Right-Nothing). There were two major findings: (1) Right-Nothing results in significantly slower learning than either Right-Wrong or Nothing-Wrong, and (2) Right-Wrong and Nothing-Wrong yield similar rates of learning.

In a Wisconsin Card Sorting Test, both neuropsychiatric patients and student nurses learned a color concept faster with Right-Wrong or Nothing-Wrong than with Right-Nothing. It was assumed that a number concept would be more difficult to learn. In the second experiment, subjects learned a number concept first and then a color concept. Only Right-Wrong and Nothing-Wrong combinations were used and there were no differences in their learning of either concept. Results of both studies confirmed predictions made on the basis of the proposed verbal reinforcement continuum: Nothing is a non-reinforcer and Right is a weaker positive reinforcer (approaching nothing) than wrong is a negative reinforcer. Buss, et al. (1956), conducted three more experiments to test this hypothesis. The following results emerged from the three experiments: (1) Right-Nothing leads to slower learning than do the other two conditions, (2) Right-Wrong and Nothing-Wrong have similar acquisition curves and both extinguish more slowly, but Right-Wrong leads to faster extinction than Nothing-Wrong. It should be noted in these studies that subjects were given trials to criterion.

The area of the effects of negative reinforcement and punishment

has been a very difficult one in which to work. Solomon (1964) has made a major contribution to the study of this area in demonstrating that:

the effectiveness of punishment as a controller of instrumental behavior varies with a wide variety of known parameters. Some of these are: (a) intensity of the punishment stimulus, (b) whether the response being punished is an instrumental one or a consummatory one, (c) whether the response is instinctive or reflexive, (d) whether it was established originally by reward or by punishment, (e) whether or not the punishment is closely associated in time with the punished response, (f) the temporal arrangements of reward and punishment, (g) the strength of the response to be punished, (h) the familiarity of the subject with the punishment being used, (i) whether or not a reward alternative is offered during the behavior-suppression period induced by punishment, (j) whether a distinctive, incompatible avoidance response is strengthened by omission of punishment, (k) the age of the subject, and (l) the strain and species of the subject.

The effect of punishment is due, in large part, to the way the response was learned in the first place and the conditions involved in the punishment situation.

The Problem of Awareness

The problem of learning without awareness has, for some time, been a controversial issue. Thorndike (1932) recognized the importance of the issue and performed several experiments in which the effects of reward and punishment influenced the responses without the subject's becoming aware of what it was he was learning. Thorndike and Rock (1934) regarded the gradual rise of the learning curve as evidence for the lack of awareness. The validity of this criterion was questioned by Irwin, et al. (1934) who pointed out that the slope of the learning curve does not necessarily reflect the presence or absence of insight. It was their contention that if the responses prescribed by the

principle were complex, the subject must learn to apply it. Irwin, et al., replicated Thorndike's experiment except that at some time during the experiment, the subjects were taught the distinction between right and wrong responses. It was found that even after the principle was fully understood, improvement usually continued to follow a gradual course. However, the analysis made by Irwin still left unsettled the problem to which Thorndike and Rock had addressed themselves, namely, whether differential reward and punishment can strengthen a class of responses without the learner's becoming aware of the principle governing the aftereffects. Postman and Jarrett (1962) used, as Thorndike had in other studies, the subject's ability to verbalize the principle governing rewards as the criterion of awareness. In order to determine the relationship between learning and knowledge of the principle, they required their subjects to state their hypotheses about the class of rewarded responses at the end of every block of twenty trials. Results indicated that there was a small but steady improvement prior to statement of the principle. Verbalization is accompanied by a pronounced increase in the number of correct responses, which in turn is followed by a further period of gradual improvement. However, performance remains far from perfect. Another group, who were informed of the principle from the start, showed gradual improvement similar to that on the post-verbalization trials.

Greenspoon (1955) was able to increase a class of responses, namely plural nouns without the subject's becoming aware of the principle of reinforcement or of the fact of reinforcement itself.

Weiss (1955) employed as criteria both the subjects' ability to verbalize the principle and, in addition, subjects were explicitly

informed of the principle. It was their conclusion that partial awareness effected performance in an unknown fashion, hence no conclusive evidence for learning without awareness was provided by the experiment.

Levin (1961) attempted to evaluate the extent to which previous evidence for conditioning without awareness is an artifact of insensitive interviewing procedures. In addition to the four questions generally used, additional questions were designed to obtain additional information from the subject without suggesting the correct contingency. Results indicated that there was evidence for conditioning without awareness when the first four questions were used as a basis for inferring awareness. When the full interview was used, the evidence for conditioning without awareness was found to have been largely accounted for by subjects who had been aware but whose awareness had not been revealed by the brief interview. There was also limited evidence for conditioning without awareness in that the group of subjects who were unaware of the reinforcer, in addition to being unaware of a correct contingency, showed as much conditioning as subjects who were aware of the correct contingency.

Although the criterion of awareness stated as the ability to verbalize is often difficult to apply, until a more reliable criterion is found, the burden of proof rests on those who insist that we cannot learn unless we are aware of what it is we are learning.

The Experimenter Variable

Although research in the area of the effect of the experimenter as a relevant source of reinforcement is sparse, it has been suggested

by a number of investigators that this variable may be an important one. Admittedly, what is needed is a systematic variation as well as a good but general operational definition of the prestige value of the experimenter and of his relationship to the subject.

There is some evidence that the same reinforcement "mm-hum" has different effects, depending on who utters it. Mausner (1955) has reported that the effect of agreement of a partner varies as a function of the prestige of the partner. Verplanck (1955) also reports that when a number of students were asked to replicate Greenspoon's experiment (1955), only those who had prestige were successful. However Cohen, et al., (1954), Wickes (1956), and Salzinger and Pisoni (1958), found no significant difference in the number of responses evoked by different experimenters. Mahrer (1956) found that the effectiveness of conditioning children was effected by their reinforcement history of contact with one experimenter but they did not generalize to another experimenter.

Some studies have been concerned with the effects of sex differences in examiners. Krasner, Ullmann, Weiss and Collins (1960) found that males obtained significant conditioning effects with male medical students while the female experimenter produced nonsignificant effects. Using nonverbal reinforcement, Cieutat (1962) found reinforcement mediated by the same sex person more effective than the opposite sex person. Bachrach (1962) found the sex of the experimenter to be a significant variable in a group situation. When the male experimenter reinforced the male subjects and the female experimenter punished, (punishing stimuli consisting of expressions of disagreement such as "I think you are wrong" regarding the meaning of an ideogram)

there was a sharp drop in the amount of talking done by the subjects.

Other studies have concentrated on chronological age differences in relation to the sex of the experimenter. Stevenson (1961) found reinforcement by an adult female more effective than by an adult male with three to four year olds of both sexes. This relation held for boys in the six to seven year range but not for girls. At the nine to ten year level, differences associated with sex of subjects and examiners were significant. A study by Epstein (1961) suggests that males from five to seven may be more responsive to a male than a female experimenter if they have a "strong masculine ego-ideal" as measured by "It Scale for Children." Baer and Goldfarb (1962) found that reinforcement of adolescents was most effective when the examiner and the subject were of the same sex.

Bergin (1961) assigned subjects to high and low credibility conditions both in terms of the experimenter and the environment. The purpose of the experiment was to examine the notion that therapeutic interpretations may operate in a way similar to persuasive communications as defined in social psychology. The results of the study indicated that the credibility factor was a highly significant one.

The review of the literature pertinent to the present investigation has traced experimental studies in the area of verbal conditioning as it is effected by both positive and negative, undetected verbal reinforcement. Although the results are not conclusive, the empirical evidence indicates that the phenomenon is a valid one and occurs in a direct, automatic and unconscious manner. The effect of the experimenter as a significant variable has also been reviewed.

Hypotheses

In general, it was the purpose of the present study to investigate the effect of undetected, verbal reinforcement in determining the perceptual learning of a frame-of-reference such that an ambiguous stimulus would be perceived in the intended direction. Specifically it was expected that:

1. the undetected verbal reinforcement of "mm-hum" or "good" following selection by the subject of a concrete meaning to an ambiguous stimulus would result in a significant increase in the frequency of words chosen with a concrete meaning.

2. the undetected verbal reinforcement of "huh-uh" or "no" following selection by the subject of an abstract meaning to an ambiguous stimulus would result in a significant decrease in the frequency of the choice of words with an abstract meaning.

3. there would be a significant difference in the effect of undetected, verbal reinforcement as a function of the sex of the experimenter.

CHAPTER II

THE EXPERIMENTAL PROCEDURE

The purpose of the present study, as previously stated, was to investigate the effects of positive and negative undetected, verbal reinforcement on the instrumental conditioning of a class of ambiguous stimuli (homonyms of the English language) to an arbitrarily defined category. Relevant variables will be discussed in this chapter.

The experiment utilized sixty subjects randomly assigned by a table of random numbers to six groups of ten each. Only subjects who had no response preference for either abstract or concrete choice of word meanings as determined by a preliminary instrument were chosen to participate in the experiment. The perceptual task involved the selection of one of two words, one having an abstract (intangible) meaning and the other having a concrete (tangible) meaning in response to an ambiguous stimulus word. The stimulus words were homonyms of the English language. The stimulus words were presented by the experimenter by tape recording and were deliberately kept at a rapid rate. The subject then circled his choice of the two responses. Responses were tabulated as the frequency of concrete choices of the total number of responses.

Experimental Design

Variables

The experiment included two independent variables. One, undetected verbal reinforcement, was administered at three levels: (a) 100% positive verbal reinforcement, (b) 100% negative verbal reinforcement, and (c) no reinforcement. The second independent variable, sex of the experimenter, was manipulated over two levels, male and female.

Two experimental groups received positive reinforcement, one by a male and one by a female experimenter. Two experimental groups received negative reinforcement, one by a male experimenter and one by a female experimenter, and two groups (controls) received no reinforcement, one by a male experimenter and one by a female experimenter. A different experimenter was used for each group. Each experimenter trained and tested ten subjects in only one condition.

All groups were surveyed under conditions of no reinforcement and tested under conditions of no reinforcement. The experimenters' manipulation of verbal reinforcement was determined to be undetected.

The dependent variable was the effect of the verbal reinforcement, both positive and negative, on the structuring of ambiguous stimuli. The dependent variable was measured quantitatively in terms of the frequency of concrete response words to the total number of response words.

Instruments

The preliminary survey (Appendix A), a pre-test instrument, was constructed by Hoggatt (1964). It consisted of one hundred stimulus

words in the form of homonyms of the English language. After each stimulus word, two response words followed, one a word with concrete meaning, the other a word with abstract meaning. Subjects were instructed to circle their first impression. It was made clear to them that there were no correct or incorrect choices.

Both the stimulus training list (Appendix B) and the response training list (Appendix C), and the stimulus test list (Appendix D) and the response test list (Appendix E) are from Aldrich (1962).

An item analysis was run on the preliminary survey by Hoggatt (1964) and twenty-three words (those identified by an asterisk in the appendix) were used to select the population of the sample. Items which fell between 40% and 60% on the item analysis were used in selecting subjects. For purposes of this study, subjects who scored eleven and twelve on the survey fell between 48% and 52% and were assumed to have no dominant response tendency.

The training list consisted of fifty stimulus words given by tape recording. The response list consisted of fifty pairs of words, one with abstract and one with concrete meaning, in a forced choice situation. Both words were considered equally meaningful as a response to the homonym. The response list was presented to the subject on a mimeographed sheet and he was instructed to choose between the two in response to the stimulus word.

The test list consisted of twenty-five stimulus words also given by tape recording, and twenty-five pairs of response words presented on a mimeographed sheet, one with abstract and one with concrete meaning.

The same female voice was used with each group tested by a female experimenter and the same male voice was used for each group

tested by a male experimenter.

Subjects

The subjects used in the experiment were students enrolled in the beginning psychology course at Oklahoma State University. The 383 students given the preliminary survey were predominantly sophomores ranging in age from 18-22 years of age. The distribution was normal in form and markedly leptokurtic.

The 60 subjects participating in the experiment were volunteers from those scoring between 48% to 52% on the pretest. They were aware that extra credit could be earned by participation in the experiment.

The sixty subjects were assigned at random to the treatment groups using a table of random numbers from Steele and Torrie (1960).

Experimental Task

Subjects were trained and tested individually by the experimenter assigned to his treatment group. All subjects were trained and tested under the same conditions in an administrative office in the Psychology Department.

The task required subjects to structure ambiguous stimuli (homonyms) as either concrete or abstract. The stimulus words were announced on a tape recorder. The subject was instructed to circle his choice of two words judged to be equally meaningful, one with an abstract meaning and one with a concrete meaning. During the training series, for subjects assigned to the positive reinforcement group, the experimenter followed the choice of the word having concrete meaning immediately with "mm-hum" or "good." He said nothing if the subject circled the

tested by a male experimenter.

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word with abstract meaning. In the negative reinforcement group, the experimenter negatively reinforced each choice of a word with abstract meaning by announcing "huh-uh" or "no." He said nothing if the subject chose the word with concrete meaning. The experiment was conducted in the same way for the two groups receiving no reinforcement except that the experimenter remained silent during the training series.

All subjects were provided with a card with a window cut out and instructed to follow their responses with it. This allowed the subject to see only one pair of words at a time. The purpose of the device was to control for possible bias occurring from the opportunity to take note of former responses.

Subjects were greeted by the experimenter and taken into the experimental room where they were seated. The experimenter sat beside them during the experiment.

The instructions for the training series were given verbally by tape recording as follows: (After Hoggatt, 1964)

Good-day. The task you are asked to do is similar to the test paper situation you had of a few days ago. The change this time is that the cue word will be given verbally on this tape recorder. There are fifty situations. I will pronounce each cue word twice and will precede each word with its number, for example: one, cow; one, cow, then opposite number one on your paper, rapidly circle your first impression. Do not look for definitions or best responses. There are no correct or most correct choices. Follow your first impression. Again there are no right, wrong, or best choices. We will move along quite rapidly, so listen carefully and circle your first impression.

If you have any questions, you now will have one minute to ask them. (One minute break in recording was timed to allow questions and at the end of one minute the tape continued):

If you are ready, we will begin.

The test series was administered immediately after the training series. It was composed of 25 ambiguous stimuli (homonyms) again presented on tape recording and 25 pairs of response choices, one with abstract and one with concrete meaning recorded on a mimeographed sheet. The instructions for the test series were the same as for the training series.

Immediately following the test situation, a check for awareness was made by having subjects answer the following four questions:

Now, on the reverse side of your paper, please answer the following four questions which refer to the last twenty-five situations in which you were engaged:

Question number one: What do you think the purpose of this experiment is?

Question number two: Did the presence of the experimenter bother you in making your choices?

Question number three: Did the presence of the experimenter influence your choice of words in any way?

Question number four: Do you think the experimenter's presence or behavior could influence your decision in choosing words?

The criteria for awareness utilized in this study was defined as a verbalization on the part of the subject as to the purpose of the experiment or the contingency between the response and the reinforcement. The analysis of the results is discussed in the following chapter.

CHAPTER III

RESULTS

In this chapter the statistical analysis employed and the results of the investigation are presented.

In order to test the effects of verbal reinforcement on the conditioning of a frame-of-reference in which cues were minimal, a population survey was employed in order to select only those subjects for the study who had no pre-existing frame-of-reference. Those subjects scoring between .48 and .52 were assumed to have no dominant response tendency in terms of structuring the ambiguous stimuli from either a concrete or an abstract frame-of-reference.

A total of 60 subjects were randomly assigned to six groups of ten each. A total of six experimenters were employed in an attempt to investigate the possibility that different experimenters constitute a significant variable operating in the process. Three reinforcement conditions, positive reinforcement, negative reinforcement and no reinforcement were employed at two levels of the experimenter variable, male and female. This arrangement totals four experimental groups and two control groups. In the four experimental groups, one male and one female experimenter were instructed to administer positive reinforcement after each choice by the subject of a concrete word in response to the ambiguous stimulus word during training trials. One male and one female were instructed to administer negative reinforcement

after each abstract choice made by the subject during training trials. In the control groups, one male and one female administered no reinforcement during training trials. All experimenters were trained by the investigator. All groups were tested under conditions of no reinforcement and the data gathered in the form of frequencies of concrete response words to homonyms presented as ambiguous stimuli.

The results of the test for awareness indicated that no subjects verbalized either the purpose of the experiment or the contingency between the response and the reinforcement.

Statistical Analysis

For purposes of analysis, the Student's t was selected as the appropriate statistic because of the small number of subjects used in each group. In order to facilitate the use of the Student's t , the frequencies were transformed into percentages and the percentages converted to inverse arcsin values according the table in Steele and Torrie (1960). The advantages in using this procedure are as follows: (1) it tends to normalize the data; (2) it makes the means and variances independent; (3) it makes the variance stable, and (4) it makes valid the application of tests for significance which require that the experimental error be independently and normally distributed with a common variance.

Tests for significance of difference between means of the control and experimental groups were made and also tests for significance of difference between experimental groups were made by use of the Student's t . The data were then pooled and tests were made between reinforcement conditions and control conditions, between sex conditions, and between

the two reinforcement conditions.

The results obtained are presented on the following pages together with conversions to percentages and transformations into arcsin values. The level of confidence arbitrarily selected for this study was the .05 level. The results of the tests of significance along with presentation of the data are presented in the following table. Since tabled t at the .05 level with 9 df is 2.262, none of the comparisons made were significant.

The data were then pooled and tests of significance using Student's t were made between:

1. Positive reinforcement (sex ignored) with no reinforcement (sex ignored),
2. Negative reinforcement (sex ignored) with no reinforcement (sex ignored),
3. Positive reinforcement (sex ignored) with negative reinforcement (sex ignored),
4. Male experimenter (reinforcement ignored) with female experimenter (reinforcement ignored).

No significant differences were revealed by these tests.

Summary

Results of the Student's t test indicate: (1) no significant difference was found in the perceptual learning of a concrete frame-of-reference resulting from undetected positive verbal reinforcement for concrete responses administered by either a male or female as compared to no reinforcement, (2) no significant difference was found in the perceptual learning of a concrete frame-of-reference using undetected

TABLE I
 STATISTICAL COMPARISONS OF EXPERIMENTAL
 AND CONTROL GROUPS

Experimental I Positive Reinf. Female			Experimental II Negative Reinf. Female			Control I No Reinf. Female		
f	p	arcsin	f	p	arcsin	f	p	arcsin
12	.48	43.85	2	.08	5.13	13	.52	46.15
15	.60	50.77	14	.56	48.45	16	.64	53.13
7	.28	31.95	9	.36	36.87	16	.64	53.13
19	.76	60.67	15	.60	54.77	7	.28	31.95
14	.56	48.45	12	.48	43.85	13	.52	46.15
13	.52	46.15	10	.40	39.23	14	.56	48.45
11	.44	41.55	10	.40	39.23	8	.32	34.45
17	.68	55.55	9	.36	36.87	17	.68	55.55
14	.56	48.48	13	.52	46.15	9	.36	36.87
21	.84	66.42	12	.48	43.85	12	.48	43.85

Exp. I with Cont. I
 $t = 1.04$

Exp. II with Cont. I
 $t = .31$

Experimental III Positive Reinf. Male			Experimental IV Negative Reinf. Male			Control II No Reinf. Male		
f	p	arcsin	f	p	arcsin	f	p	arcsin
12	.48	43.85	15	.60	50.77	14	.56	48.45
10	.40	39.23	16	.64	53.13	14	.56	48.45
14	.56	48.45	8	.32	34.45	14	.56	48.45
14	.56	48.45	7	.28	31.95	9	.36	36.87
16	.64	53.13	12	.48	43.85	9	.36	36.87
15	.60	50.77	14	.56	48.45	13	.52	48.15
10	.40	39.23	16	.64	53.13	11	.44	41.55
17	.68	55.55	18	.72	58.05	13	.52	46.15
12	.48	43.85	15	.60	50.77	18	.72	58.05
15	.60	50.77	11	.44	41.55	13	.52	46.15

Exp. III with Cont. II
 $t = .52$

Exp. IV with Cont. II
 $t = .696$

Exp. I with Exp. III
 $t = .57$

Exp. II with Exp. IV
 $t = 1.52$

negative reinforcement administered by a male or a female as compared with the control group, (3) no significant difference was found between male and female experimenters administering positive reinforcement, and (4) no significant difference was found between male and female experimenters administering negative reinforcement.

A discussion of the results and conclusions are presented in the next chapter.

CHAPTER IV

DISCUSSION AND CONCLUSIONS

The present study attempted to investigate the effect of both positive and negative reinforcement on the conditioning of a concrete frame-of-reference from which ambiguous stimuli could be meaningfully interpreted. Aldrich, (1963) found that positive reinforcement did result in the subjects' perceptually learning a frame-of-reference from which either concrete or abstract meaning of words could be structured. Hoggatt, (1964) obtained similar results in an extension of the Aldrich study. The present study also attempted to investigate whether or not the experimenter administering the reinforcement exerted a significant effect on the conditioning of a frame-of-reference.

Sixty college students were selected from a population who indicated no preference for either a concrete or an abstract frame-of-reference and randomly assigned to six treatment groups of ten each. Each group received either positive reinforcement, negative reinforcement or no reinforcement. A total of six experimenters participated in the experiment; each experimenter administered the reinforcement to only one treatment group. Experimental groups I and III received positive reinforcement for concrete word choices, experimental groups II and IV received negative reinforcement for abstract word choices and the control groups I and II received no reinforcement. All groups

were tested under conditions of no reinforcement.

The results of the experiment did not indicate that a concrete frame-of-reference from which meaningful structuring of ambiguous stimuli could be interpreted was learned either through negative or positive reinforcement. The question arises as to why two other investigators were able to condition either an abstract or a concrete frame-of-reference with positive reinforcement. The literature reports many other studies in which a selected response was successfully conditioned through verbal reinforcement. Krasner (1958) reports the results of a number of studies, the preponderance of which have obtained significant results. When Verplanck tried to replicate Greenspoon's experiment with Harvard students, he found the prestigious and experienced examiners were more successful. Although all six experimenters in the present study were graduate students, significantly older than the subjects and judged about equal by the investigator in prestige value, it is quite possible that an individual with very high prestige might be more successful. Even though all the experimenters were trained by the investigator, they would be considered inexperienced experimenters.

Taffel (1955) obtained significant results with "good" as a reinforcer of selected pronouns but not with a light. He suggests that it is possible for a stimulus to function as a reinforcer in a verbal situation which involves an attempt at communication. He asserts that the stimulus itself must contain associations or connotations that can be related to the success or failure of this attempted communication.

The design utilized in this study made it impossible to determine

the influence of each experimenter due to the fact that the experimenter variable was confounded with the reinforcement variable. Should a study of this nature be repeated, it is suggested that each experimenter administer equal numbers of all three treatment conditions. In this way, the effect of each experimenter can be evaluated. As the study was designed, only differences between males and females administering the various reinforcements could be analyzed.

It is further suggested that lengthening the training list is indicated for further experimentation. It is possible that the fifty items used are insufficient for conditioning.

Krasner (1958) in his review of verbal conditioning studies makes a fine discrimination between two types of studies. On the one hand, there are studies which belong together by virtue of being studies of operant conditioning of verbal behavior. These tend to be the studies in which words are emitted by the subject and a certain class are selected and reinforced by the experimenters. These studies are primarily concerned with a specific class of responses, such as plural nouns, the effects of psychotherapy, and the conditioning of affective responses in schizophrenics. He states that these should be differentiated from another group of studies to which have been applied the label of "verbal conditioning" which usually involves the conditioning of verbal expectancies using the Humphrey's procedural paradigm. The response conditioned was usually pressing one of two available keys to predict the occurrence of a random event. Following the subjects' prediction, the examiner presents one of the to-be-predicted events according to a predetermined random sequence. Further he states that a variation of this occurs in those studies in which the occurrence of the

reinforcement event is contingent upon the appropriateness of the subject's response. These studies have been used to test predictions from statistical learning theories. In none of the studies cited was the subject told that a learning task was involved nor was it presented as a learning task.

A number of studies have appeared in the literature recently using positive and negative reinforcement in the form of "Right" and "Wrong" but in a somewhat different form. In addition, several of these studies have attempted to define the role of the verbal reinforcer.

The experiments conducted by Buss, et al. (1956) referred to earlier in the review of the literature, utilize a procedure in which different combinations of positive and negative reinforcement are administered. In one group the experimenter said "right" for a correct response and "wrong" for an incorrect response, i.e., each response is reinforced. In a second group the experimenter said nothing for a correct response but "wrong" for an incorrect response, and in a third group the experimenter said "right" for a correct response and nothing for an incorrect response. Results of these studies indicate that Right-Wrong and Nothing-Wrong result in faster learning than Right-Nothing. Buss, et al. (1956) explain these findings in terms of the potency of reinforcers. According to them, "Wrong" is a stronger negative reinforcer than "Right" is a positive reinforcer.

Levine, Leitenberg and Richter (1964) question the role of "Right" as a reinforcer of responses. It is their contention that the behavior of subjects during trials when no outcomes are given is the same as the behavior of subjects when the experimenter says "Right" following each response. In these studies, trials without outcomes are referred

to as "blank" trials. However, a complete problem consisting of blank trials only is referred to as a Nonoutcome problem. The model predicts that during Nonoutcome problems, the subject behaves as though the experimenter were saying "Right." Four different experiments were devised to evaluate this the theorem: (1) a standard learning set experiment, (2) a modified double alternation experiment, (3) one involving contingent discriminations in which the correct response is contingent on some other aspect of the stimulus situation, and (4) a guessing problem, a modification of the Humphrey's (1939) guessing problem. The predicted results were obtained in each of these experiments.

The investigators make the assumption that what is effected by the outcome procedure is the subject's hypothesis. The hypothesis constitutes a mediating process defined as a prediction about what constitutes solution behavior. The hypothesis held produces either responses to selected cues or to sequential organization of choice responses. The mediating process or hypothesis, is manifested in a specific response sequence and both "rights" and blank trials produce no changes in the subject's hypothesis, hence no difference in sequence of responses manifested. In contrast, "wrong" causes the subject to alter or reject his hypothesis, thereby producing a different response series.

According to this view "right" does not strengthen the choice response but rather maintains the mediating process as does nothing.

Spence and Lair (1965) obtained the same results in a 2-alternative verbal discrimination task with open-ward schizophrenics but suggest a very different explanation of the superiority of the Right-Wrong and Wrong-Nothing combinations over Right-Nothing. These investigators

emphasize the informational value of the reinforcer. They suggest that while subjects in the Wrong-Nothing condition quite easily grasp the information being given by the experimenter's failure to respond, subjects in the Rn condition are less able to do so and that it is this confusion about the meaning of "nothing" following incorrect choices that is responsible for the inferior performance of these subjects.

There are several major differences between this group of studies and the present investigation. First, in all these studies subjects were at least vaguely aware that there was a problem to be solved. Although they were not told that the experimenter intended to influence their choices, the subject could easily connect the two conditions. In the present investigation, subjects were told that there were no correct or incorrect choices; simply to choose their first impression as a response to the stimulus word.

In addition, observation of the data indicate that in the group given negative reinforcement by a female, the average frequency of concrete responses tended to decrease rather than increase. This effect is frequently found in the initial trials of studies employing shock. When subjects know that a task is involved, it seems intuitively reasonable to expect the subjects to use the reinforcement administered by the experimenter as a cue to problem resolution; whereas in the present experiment, the subject could easily interpret the negative reinforcement as an evaluation of his performance. In this case individual variation might wash out the effects of negative reinforcement.

These studies tend to indicate that some investigators are finding that positive verbal reinforcement does not effect learning

under some conditions. This does not indicate that verbal reinforcement is ineffective, but rather that a more careful specification of the variables as well as the design and procedure are indicated, in order to adequately investigate the effect of both positive and negative reinforcement in the conditioning of verbal responses.

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APPENDIX A
PRELIMINARY SURVEY

1. Her	Female - Person	26. Cook	Prepare - Food
2. Did	Yesterday - Effect	27. Half	Part - Athletics
3. Back	Football - Reverse	28. Father	Parent - Religion
4. Very	Truth - Same	29. Land	Disembark - Earth
5. Five	Dice - Number	30. Full	Cup - Complete
6. Both	Us - Equally	31. Red	Color - Brick
7. Night	Dark - Moon	32. School	College - Education
8. Perhaps	Cards - Chance	33. Was	Place - Time
9. Step	Foot - Advance	34. Children	Small - Infant
10. Mister	Man - Respect	35. Another	Again - Person
11. When	Clock - Moment	36. Cause	Reason - Person
12. May	Let - Month	37. First	Preceding - Sports
13. Year	Sun - Time	38. Now	Here - Act
14. Word	Idea - Book	39. Fire	Ember - Warmth
15. Knight	Romance - Roundtable	40. Bed	Sleep - Furniture
16. Came	Travel - Vehicle	41. Name	Title - Speak
17. Seen	Experience - Eye	42. Enough	Ample - Supplies
18. Door	Entrance - Open	43. Company	Friendly - Business
19. Make	Build - Trademark	44. Dead	Devoid - Cemetery
20. Hair	Head - Slender	45. Some	Unspecified - Persons
21. Silk	Stocking - Soft	46. Receive	Television - Accept
22. Up	Aircraft - Direction	47. Food	Meal - Hunger
23. Book	Read - Ledger	48. Wait	Remain - Servant
24. Voice	Ballot - Express	49. During	Calendar - Time
25. Have	Possession - Control	50. From	Motive - Home

APPENDIX A (Continued)

1. Hard	Rock - Difficult	76. Start	Race - Move
2. Took	Seized - Robber	77. Home	House - Affections
3. Each	One - Person	78. Between	Comparison - Space
4. People	Common - Tribe	79. Next	Near - Neighbor
5. Reason	Statement - Motive	80. Even	Smooth - Number
6. Us	Together - Group	81. Body	Physical - Corpse
7. Country	Farm - Patriotic	82. Out	Beyond - Country
8. And	More - Arithmetic	83. Low	Note - Elevation
9. Horse	Sport - Polo	84. Among	Crowd - Divide
0. Long	Train - Extent	85. No	Vote - Opposing
1. Give	Gift - Allow	86. Who	Sound - People
2. Of	From - Clock	87. Mother	Love - Parent
3. Demand	Money - Order	88. Before	Front - Nose
4. Feel	Hand - Sense	89. Plan	Method - Blueprint
5. Get	Money - Acquire	90. Around	Lie - Circle
6. Might	Military - Power	91. Girl	Sweetheart - Pretty
7. Day	Calendar - Light	92. I	Me - Aware
8. Bring	Lead - Hand	93. House	Building - Legislature
9. Hour	Clock - Time	94. Second	Clock - After
0. Come	Approach - Sailing	95. Family	Warm - Household
1. Begin	Start - Freshman	96. Space	Room - Explore
2. Seem	Appear - Mind	97. Mouth	Oral - Tongue
3. Against	Contrary - Vote	98. At	Direction - Arrow
4. Good	Property - Satisfactory	99. Less	Arithmetic - Smaller
5. Cry	Sorrow - Tear	100. Mean	Statistics - Personality

APPENDIX B

STIMULUS TRAINING LIST

- | | |
|-------------------|--------------------|
| 1. AIR / HEIR | 26. HALE / HAIL |
| 2. PAIR / FEAR | 27. SORE / SOAR |
| 3. REIGN / RAIN | 28. FELT |
| 4. VANE / VAIN | 29. CORE / CORPS |
| 5. MAZE / MAIZE | 30. AUNT / ANT |
| 6. SHEER / SHEAR | 31. BLEW / BLUE |
| 7. BAWL / BALL | 32. STEER |
| 8. LOCK / LOCH | 33. DO / DEW |
| 9. OR / ORE | 34. TEEM / TEAM |
| 10. OUR / HOUR | 35. SHOW |
| 11. HIM / HYMN | 36. FLEW / FLUE |
| 12. SOUL / SOLE | 37. SOW / SEW |
| 13. BEAU / BOW | 38. OH / OWE |
| 14. EARN / URN | 39. TEA / TEE |
| 15. DOWN | 40. BORE / BOAR |
| 16. ADD / AD | 41. COLOR |
| 17. BELLE / BELL | 42. RODE / ROAD |
| 18. TIDE / TIED | 43. BARON / BAREN |
| 19. SHOOT / CHUTE | 44. BARE / BEAR |
| 20. MALE / MAIL | 45. MADE / MAID |
| 21. WAY / WEIGH | 46. ALTER / ALTAR |
| 22. DONE / DUN | 47. NOTE |
| 23. SEEM / SEAM | 48. SALE / SAIL |
| 24. SURGE / SERGE | 49. FAIR / FARE |
| 25. MISS | 50. CARROT / KARAT |

APPENDIX C

FORCED CHOICE TRAINING RESPONSE LIST

1. BREATHE - SON
2. DUAL - FRUIT
3. KING - FALL
4. SELFISH - WEATHERCOCK
5. CEREAL - INTRICATE
6. TRANSPARENT - SHEET
7. TENNIS - CRY
8. SCOTLAND - SECURE
9. RATHER - MINER
10. POSSESS - MIDNIGHT
11. HE - CHOIR
12. LEATHER - SPIRIT
13. TIE - DATE
14. VASE - DESERVE
15. UNDER - FEATHER
16. NEWSPAPER - SUM
17. TELEPHONE - BEAUTY
18. BOUND - OCEAN
19. HUNT - SKYDIVER
20. POSTMAN - MASCULINE
21. METRECAL - MANNER
22. BILL - FINISHED
23. APPEAR - THREAD
24. SUIT - THROB
25. ERROR - GIRL
26. STORM - HEALTHY
27. GLIDER - TENDER
28. HAT - EMOTION
29. MARINE - CENTER
30. PICNIC - KIN
31. SKY - GUSTY
32. DIRECT - CATTLE
33. MOISTURE - ACCOMPLISH
34. SWARM - PLAYER
35. ACTOR - DISPLAY
36. SOAR - CHIMNEY
37. BUTTON - SCATTER
38. SURPRISE - DEBT
39. FAIRWAY - BREW
40. SWINE - CALIBER
41. SHADE - CRAYON
42. CARRY - MAP
43. ARISTOCRATIC - DESERT
44. KODIAK - EMPTY
45. BUILT - SERVANT
46. SERMON - MODIFY
47. PAD - OBSERVE
48. BARGAIN - YACHT
49. TICKET - EQUAL
50. DIAMOND - GROW

APPENDIX D

STIMULUS TEST LIST

- | | |
|--------------------|-------------------|
| 1. MEDAL / MEDDLE | 14. MEET / MEAT |
| 2. FLEE / FLEA | 15. RIGHT / WRITE |
| 3. COARSE / COURSE | 16. ATE / EIGHT |
| 4. REAL / REEL | 17. STAIR / STARE |
| 5. DIE / DYE | 18. STEEL / STEAL |
| 6. PALE / PAIL | 19. ROLL / ROLE |
| 7. SEA / SEE | 20. ARC / ARK |
| 8. PAIN / PANE | 21. SCENT / CENT |
| 9. BEAT / BEET | 22. DEER / DEAR |
| 10. BE / BEE | 23. GREAT / GRATE |
| 11. HERD / HEARD | 24. ALE / AIL |
| 12. TALE / TAIL | 25. KNOT / NOT |
| 13. MANE / MAIN | |

APPENDIX E

FORCED CHOICE TEST RESPONSE LIST

- | | |
|---------------------------|-----------------------|
| 1. DECORATION - INTERFERE | 14. STEAK - ENCOUNTER |
| 2. ESCAPE - INSECT | 15. LETTER - JUSTICE |
| 3. ROUTE - CRUDE | 16. NUMBER - CONSUMED |
| 4. FILM - TRUE | 17. STEPS - GAZE |
| 5. STAIN - PERISH | 18. METAL - ROB |
| 6. BUCKET - DIM | 19. ROTATE - PASTRY |
| 7. TIDE - LOOK | 20. BOAT - CURVED |
| 8. GLASS - HURT | 21. ODOR - PENNY |
| 9. VEGETABLE - WIN | 22. PRECIOUS - FAUN |
| 10. EXIST - HONEY | 23. BARS - IMMENSE |
| 11. AUDIBLE - FLOCK | 24. SICK - BEER |
| 12. WAG - FABLE | 25. SHOELACE - NEVER |
| 13. PRIMARY - LION | |

VITA

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Candidate for the Degree of
Master of Science

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POSITIVE AND NEGATIVE REINFORCEMENT AND THE SEX OF THE
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