A comparison of the effects of five schedules of reinforcement on a selected verbal response class.

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A COMPARISON OF THE EFFECTS OF
FIVE SCHEDULES OF REINFORCEMENT
ON A SELECTED VERBAL RESPONSE CLASS

A Dissertation Presented
By
LESLIE EDWARD DOLHENTY, JR.

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CHAPTER I
INTRODUCTION

It is generally agreed among educators today that public school systems should become more and more comprehensive, much along the guidelines offered by Conant (1). Startling evidence can be adduced for the movement if one looks at the number of school district consolidations taking place within the past few years (2: 41).

With the aforementioned increasing comprehensiveness has come the increase in the number of specialists employed in the public schools. Among the specialists the school counselor must rank first in terms of growth in numbers employed in recent years. Over the five year period the increase in full time equivalence of counselors in secondary schools was from 12,000 in 1958 to 27,180 in 1963 (3).

Within the broad area of guidance, the service of counseling is seen by most school counselors and counselor educators as the heart of the program. Wrenn (4: 20) in his influential guidance work, The Counselor in a Changing World, cited a study of secondary school counselors that stated their perception of the need for counseling with students. The counselors were asked to describe the basic activities of a counselor in 1980, and 57 per cent of 638 suggestions bore
on counseling. Other counselor educators such as Andrew and Willey (5: 193) identify counseling with students as the most basic service in the guidance program.

Along with the expanding role of guidance and counseling in the public schools, an awareness of the need to define parameters of the counseling relationship has come into focus. It has been recognized that the effectiveness of counseling needs a great deal more documentation. One research approach to the counseling relationship is an inspection of the interaction of counselee verbal behavior and counselor attention to this behavior. To this end, a delineation of the counseling relationship in terms of the pre-selection of a specific class of counselee verbal behavior and the systematic focus of counselor attention to this behavior will be the interaction involved in this study. More specifically, counselor attention (reinforcement) will be directed to counselee self-reference statements and guided by systematic schedules of reinforcement. The Skinnerian operant conditioning paradigm will provide the foundation for the research which will be conducted in a quasi-counseling setting.

Definitions of Terms Used

Selected Verbal Behavior

Counselee self-reference statements were defined as follows: all statements containing "I, my, mine, me, myself,"

the first person plural pronoun "we" and the possible use of an indefinite pronoun such as "one" will constitute this class.

Reinforcing Stimulus

The reinforcing stimulus* which will be made to self-reference statements will be an attentive "mm-hmm" and a positive head nod on the part of the experimenter.

Operant Level

The level of the pre-selected class of behavior is established during this session. The subject's emissions of the response class is enumerated while under random reinforcement.

Conditioning

The subject's emissions of the response class is enumerated while under systematic reinforcement according to the treatment involved.

Extinction

The subject's emissions of the response class is

*This terminology will be utilized throughout the paper. The investigator is aware that the use of reinforcing stimulus or reinforcer is not correct in that it does not become a reinforcer until results indicate that it has truly reinforced behavior. However, in the "opinion of the investigator" this terminology is better understood in relation to the main theme of this research which is, schedules of reinforcement. In this context reinforcement seems more intelligible than the use of a term such as stimulus condition.
enumerated following the conditioning period, while once again random reinforcements are applied.

Operant Conditioning

Operant behavior is behavior which operates on the environment to generate consequences and a reinforcer is contingent upon a response. In the Pavlovian experiment, a reinforcer is paired with a stimulus.

Schedules of Reinforcement

"In general, behavior which acts upon the immediate physical environment is consistently reinforced but a large part of our behavior is reinforced only intermittently" (6: 99). Two basic types of schedules should be distinguished. One is the ratio schedule which is controlled by the behavior of the subject. Reinforcement in this type of schedule is dispensed after a certain number of subject responses have been emitted. The other schedule is the interval schedule and is set up by the clock. We reinforce after a specific amount of time has elapsed, allowing intervening responses to go unreinforced.

**Fixed interval.**—A reinforcement schedule is set up by the clock to reinforce every nth minute.

**Variable interval.**—A reinforcement schedule is set up by the clock to reinforce in a planned sporadic manner
around a mean of every nth minute. The intervening interval may be only a few seconds or as long as several minutes.

Fixed ratio.--A reinforcement schedule is set up in accord with the subject's responses. Every nth response is reinforced.

Variable ratio.--A reinforcement schedule is set up around a mean value which varies the ratio of response over a considerable range. Successive responses may be reinforced or a great many responses may go unrewarded.

Continuous.--Every response of the selected class is reinforced.

Statement of Problem

The purpose of this research is to test the relative effectiveness of five schedules of reinforcement in increasing a response rate of a selected class of verbal behavior. The study will also ascertain the resistance to extinction that the reinforced verbal class has under each different schedule. In relation to the conditioning effects on the pre-selected verbal response class, the subject's awareness of the purpose of the experimental session will be tested. The question of whether or not the conditionability of the subject is affected by awareness of the contingencies of the experimental session has to be answered in each investigation of this type.

An area to be studied concomitantly will be the
relation that personality traits, as measured by a personality inventory, have with the conditionability (i.e., the increase in the number of responses of the reinforced verbal response class) of the subject's verbal behavior.

**Need and Significance**

There has been a great deal of debate related to the guidance service of counseling. The debate has ranged from whether or not school counselors should engage in personal-social counseling, to the types of counseling orientation that might best serve public school students, to the amount of time a school counselor should spend in counseling. The school counselor sees himself as functioning more and more in a counseling relationship with students as pointed out by Wrenn (4: 20) while the counselor educator on a national basis recognizes counseling as the key service within the pupil personnel construct as attested to by Andrew and Willey (5: 193).

Arbuckle (7: 85) and Ohlsen (8: 175) state that counseling is accepted as the most basic aspect of guidance, albeit an area about which there is considerable confusion. Although there is debate as to what counseling is and what counselors should be doing, most would agree that the objective of counseling would be some change in the counselee's behavior. Krumboltz (9: 383) states this position
In order to focus on the purpose of counseling, I have elected to use the term "behavioral counseling." The adjective "behavioral" does not imply that there are other kinds of counseling that should be categorized as "non-behavioral counseling" only as a reminder that all counseling is designed to affect the behavior of the client. I know of no counselor or psychotherapist of any school of thought who would deny that he hopes to influence the behavior of his client. In this sense, all counseling is behavioral counseling, although occasionally counselors appear to forget this fact.

Despite the fact that this criterion has been generally accepted, the process of counseling for behavioral change is one that has continued to defy control. In this regard one study has shown that experienced and neophyte counselors of different counseling orientations resemble each other more than experienced or neophyte counselors of the same orientation (10). Further, the outcomes of counseling as related to behavioral change have also been lacking in definitive studies which might show significant change (11).

If one accepts that the counseling relationship is based primarily on the verbal interaction between counselor and counselee then research related to the nature of verbal behavior becomes vital.

Success in counseling can be seen as dependent on a number of variables, among which counselor reaction and reinforcement (negative or positive) to counselee verbalizations must be recognized as important to favorable outcome. The operant conditioning paradigm offers a context
in which verbal behavior in the counseling setting can be studied while holding a large number of variables constant. This behavioristic approach to counseling allows for explicit operational definition of variables.

The significance of the study is understood best when attention is directed to the precise manner in which reinforcements are dispensed by counselors. As is the case with the reinforcement one receives in most everyday life situations, the counselor reinforcements dispensed during a counseling setting are intermittent rather than continuous. The problem lies, however, not in sporadic intermittent reinforcement as contrasted with a continuous effort but in a comparison of systematically scheduled intermittent and continuous reinforcement and its effects.

Strong (12: 663) lucidly states the problem as follows:

Experimentation with animals has repeatedly shown that intermittent reinforcement produces behavior more resistant to extinction than reinforcement of 100 per cent of the reinforceable responses occurring. Different schedules of reinforcement (systematic relationships between the number of responses or the passage of time and the deliverance of reinforcement) have been shown to produce characteristically differing cumulative response records. The characteristics of verbal behavior under various schedules is of considerable importance in assessing its status within a behavioristic system.

The significance of the total problem should be increased due to the control of the counselee response class which will be reinforced. Counselee self-reference statements
which have previously been labeled as relevant to the counseling process by Rainy (13) will be studied under the effects of the systematic schedules of reinforcement. The need for controlled studies of reinforcement scheduling is attested to by Kransner (14: 72).

In the therapy situation, timing of therapist behavior vis-a-vis patient verbalizations is of major importance. The therapist must make a quick decision whether a response of the patient belongs to the class to be reinforced. If so, is this the time to reinforce it? A failure to do so may extinguish the response, at least for the moment. Thus in an analysis of the effectiveness of the cueing of E, scheduling of this cueing is a major factor.

Other variables such as setting, reinforcing stimuli, instructions and counselor preparation will be controlled for variability.

Research in verbal conditioning is a viable area of investigation and the importance of research on a systematic approach to encourage counselees to talk is in evidence in the following statement by Schaffer and Lazarus (15: 306): "The techniques of getting the patient to talk and to continue to talk must be the real core of the treatment."

Related to the influence of verbal behavior in the operant conditioning model is the problem of subject awareness. If the subject is able to state the response class, the reinforcer and the contingency between the two, the phenomenon that has operated must be described as human problem solving. This study deals with the awareness problem which has led to no small amount of controversy. In an
extensive review on the subject, Adams (16: 403) has concluded "that evidence for learning without awareness is equivocal."

It is essential that investigations into the parameters of the counseling situation be conducted in a context paralleling as closely as possible those of counseling and psychotherapy, while retaining the rigor and controls necessary in scientific inquiry.

**Source and Character of the Data**

The data were obtained from experimental sessions with seventy-five female students majoring in education at the University of Massachusetts. These students also took a personality test which will supply another source of data for the study. Further data were compiled on a test of awareness which was given to each student at the end of the experimental sessions.

The results of the experimental sessions are conditioning scores related to counselee self-reference statements which were reinforced during the experimental segment of the session. Personality test scores were obtained on the Sixteen Factors of the Cattell Personality Factor Questionnaire plus four second-order factors. The awareness tests yielded a level of understanding on the part of the subject as to the purpose of the experimental session.

The fact that the subjects used in the research were
not representative of the total population was not a priority consideration. The most important contingency was the investigation of possible outcomes of one schedule of reinforcement as compared to another in relation to counselee verbal behavior rather than generalizing about an entire population.
Notes to Chapter I


CHAPTER II
REVIEW OF THE LITERATURE

Introduction: Guidance, Counseling, Psychotherapy

The importance of the counseling relationship in the field of guidance in the public schools is given high priority by the American School Counselor Association's policy statement of 1964, which recommended that 50 per cent or more of a counselor's time should be spent in counseling (1).

Although this importance is well recognized by counselor educators and practitioners alike, there is a great deal of confusion concerning the service. This recognition of the importance and confusion is in evidence in the following statement by Andrew and Willey (2: 193).

While guidance authorities do not question the value or place of counseling, there exists much confusion concerning the nature and results of the counseling process. Arbuckle summarizes the confusion by stating that counselors still tend to think of counseling all the way from the broad, all-inclusive omnibus definition which makes counseling and guidance practically synonymous to the much narrower concept of counseling as being synonymous with psychotherapy.

Other guidance writers such as Moser and Moser (3: 12), Arbuckle (4: 162), and Johnson, Stefflre and Edelfelt (5: 293-294) highlight this dilemma of the importance of counseling in the guidance program and the confusion associated with it.

The proliferation of orientations feeding into the field of public school guidance has added to this perplexity.
Gazada (6) identifies counseling orientations of eclecticism, existentialism, client-centered, ego counseling, minimum charge therapy, and the moral conflict theory. In addition to these orientations, he identifies the two distinctive approaches of individual and group counseling.

The Harvard Education Review of the fall of 1962 in a review of the field of guidance identifies many of the orientations cited by Gazada and adds that of behavioral counseling in the writings of Michael and Myerson (7). Not only are the number of orientations feeding into counseling cause for some confusion but the area of counseling itself has not been clearly distinguished from that of psychotherapy. Patterson (8: 1) states the problem as follows:

Counseling and psychotherapy are both used in the title of this book because it appears to be impossible to make any clear distinction between them. If experts in counseling and psychotherapy were asked to list the theories which should be considered under each heading, there would probably be great overlapping in the lists.

Further evidence that there is no agreed upon approach to counseling can be seen in the eclecticism of Humphreys, Traxler and North (9: 165), Froelich (10: 207), and Andrew and Willey (2: 207).

Moving outside of the field of guidance, we find the studies of Eysenck (11) and Fieldler (12) that attempted to assess outcome and process respectively, showing the dearth of definitive statements that can be made in relation to
counseling and psychotherapy.

The Behavioral Approach: Counseling, Psychotherapy, and Verbal Conditioning

The General Area

Recently a series of investigations in the field of behavioristic therapy have caught the attention of counselor educators throughout the country and many others interested in the broad field of psychotherapy. Briefly the *modus operandi* is to utilize the tenets and principles of learning theory in the therapeutic relationship. "The key concepts in this new approach to psychotherapy are social reinforcement and behavior control. Social reinforcement refers to the use and manipulation of environmental stimuli to reward pre-selected classes of behavior in such a way as to increase the probability of their reoccurring" (13: 601).

In a broader psychotherapeutic context the work of Wolpe, Salter, Lang, Hussin, et al., reported in a recent book by Wolpe, Salter, and Renya (14) issues a clear challenge to other psychotherapies on the basis of results they have achieved and measured with empirical controls. Wolpe (14: 15) makes the challenge when he states that "the present position is clear. As far as the evidence goes, conditioning therapies appear to produce a higher proportion of lasting recoveries from distress and disability of neurosis than does psychoanalysis." The reference to psychoanalysis is best understood
when one considers that Wolpe is making reference to the form of psychotherapy which has long been considered the best of available psychotherapeutic processes. Stevenson (15: 3) makes this mode of thinking clear in the following statement:

For the most part, the psychoanalysts have had the discussion very much their own way, with relatively little challenge of their position that psychoanalysis was by far the best method of treatment, and the best course for the patient to pursue.

In another review of learning theory techniques in behavioral change, Ullmann and Krasner (16) cite studies ranging on a continuum from "severely disturbed behaviors" to the use of this model to effect greater cooperation between children.

School Counseling

In the field of school counseling, a number of researchers and counselor educators have begun to concentrate their interests on behavioral counseling. In a recent article Thorenson (17: 18) states "I think counseling can move toward becoming a behavioral science, using methods scientifically developed, without dehumanizing the client or the counselor." A very strong stance on the relevance of the behavioral position in counseling is taken by Michael and Myerson (7: 396).

The entire field of guidance, counseling, and psychotherapy might benefit considerably if all workers considered seriously just one behavioral principle and its corollary, namely, that behavior is controlled by
its environmental consequences and that an effective procedure for producing behavioral change is the manipulation of the environment so as to create consequences that will produce the desired behavior.

Research by Krumboltz and his students concerned with the learning theory approach has dealt with several interesting areas of behavior. Krumboltz and Schroeder (18) employed reinforcement counseling and model-reinforcement counseling with eleventh grade students. The response class reinforced was information seeking behavior (ISB). Both experimental groups demonstrated a significant increase in ISB as compared with the control group. Krumboltz and Thoresen (19) utilized the above two experimental manipulations and added a control that was exposed to a film strip and discussion in addition to the inactive control. The experimental procedures produced more external ISB than either control. In another study directed by Krumboltz, Ryan (20) was successful in conditioning decision-making and deliberation responses and further found these responses generalized to a classroom setting.

The above studies have led Krumboltz (21) to observe that we have scarcely begun to assess the effects of counselor techniques in relation to their specific effects on client behavior.

Verbal Interaction: The Vehicle of the Counseling Process

Counselor educators and others involved in the counseling profession see the vehicle of the counseling process
to be the verbal interchange between counselor and counselee. "Counselors and guidance workers have long been aware of the need to deal with both intellectual and emotional content of words" (22: 86-87).

Arbuckle (4: 165) states this position in his definition of counseling.

An interaction between two people that enables the disturbed individual to come to the point where he can make choices and decisions that are rational and logical; it is an interaction that is basically verbal, and is emotional in nature; it is an interaction that enables the individual to accept and to use information and advice, and to accept an unchangeable environment without being overcome by it. (Emphasis added.)

Marzolf (23: 308) and Froehlich and Hoyt (24: 261-262) also lend support to the verbal interchange as the vehicle of the interpersonal relationship.

The need for research into the nature of this verbal behavior of client and counselor in the counseling setting is well established. In turn, researchers have found the operant conditioning paradigm to be a model which permits control of a number of significant variables in this setting. Recently, studies in verbal conditioning using this model have been recognized as a valuable addition to the research in counseling. As Patterson (8: 141) states:

There is no question, however, about the existence of verbal operant conditioning or of its importance in counseling or psychotherapy. It is not a simple process, however, but is influenced in many ways and by many variables in the client, the counselor, and the situation or atmosphere, and the interactions among these. Much more study and work is necessary before we can know the extent and limits of the technique, and
its relation to other aspects of the relationship known as counseling or psychotherapy.

**Verbal Conditioning**

Within the past fifteen years, a number of studies have appeared in the literature concerned with experimental attempts to establish the parameters of the counseling (interpersonal) relationship. These studies have, in general, applied learning theory to the conditioning of verbal behavior. The research reviewed here will be concerned with the application of the Skinnerian paradigm of operant conditioning to the study of verbal behavior.

The studies designate a class of verbal behavior as the dependent variable and one of several reinforcing conditions as the independent variables that control the preselected verbal class. The researchers have attempted to isolate and measure the aspects of the interrelationships and consequences of the numerous variables involved in the study of verbal behavior.

In the process of this approach, experimental designs have been developed and several significant variables have been isolated. An explanation of the designs and variables follows.

**The Designs**

**The Taffel-make-up-a-sentence method.**—The design
used with the greatest frequency was developed by Taffel (25). He employed 3x5 white unlined cards as a stimulus, with a past-tense verb and six pronouns (I, we, you, he, she, they) typed on each card. The verb was typed in the center with the pronouns arranged in different orders on a number of cards. The subject was instructed to make up a sentence using the verb and any of the pronouns to begin the sentence. The responses usually reinforced were sentences beginning with "I" or "we." A number of subsequent studies employed this basic design and changed the number of pronouns and designation of the verbs (e.g., mildly hostile to intensely hostile verbs).

The autokinetic method.--This technique is usually employed in a complete blackout and the stimulus situation is the length of movement of a small light. In one study, Spivak and Papajohn (26) reinforced a pre-selected distance as being correct.

The story-telling method.--Basically, two methods of this design are employed. One uses a stimulus to respond to in telling a story and the other does not. Some of the stimuli used in the first type have been inkblots and TAT cards; while in the second situation, the subjects are asked to talk about a certain theme or tell a story including specific words.

In these types of designs, Ullmann and Krasner and Collins (27) and Weiss, Krasner, and Ullmann (28) reinforced
emotional words, while Ball (29) reinforced animal responses after instructing his subjects to include "man," "woman," and "animals" in their stories.

The say-separate-words method.—This method was developed by Greenspoon (30, 31). The subjects are instructed to say separate words or numbers without ordering them until the session terminates. Once again, different response classes have been reinforced, such as human words (32) and plural nouns (31, 33).

The interview method.—The subject is asked a question or in some other manner engaged in an interview-type situation. Typically, this method has been used without telling the subjects that they are participating in an experiment. Therefore, face validity has to be established. Verplanck (34) used graduate students to "interview" and instructed them to reinforce opinion statements made by the subjects. Other studies have reinforced statements of affect (35) and agreement and disagreement with a questionnaire (36).

The Variables

The setting.—The setting for these operant conditioning studies has in the main been experimental with volunteer subjects. In a review of thirty-one studies concerned with the operant conditioning of verbal behavior, Krasner (37) identified twenty-seven as described above. In most of the studies conducted thus far, subjects knew they were engaging
in an experiment of sorts. One notable exception was a study by Verplanck (34) who used graduate students to reinforce opinions of subjects as the designated response class.

**Response class**.--"A response class consists of a number of different responses which are similar to each other in the sense that the occurrence of one may be substituted for that of another" (38: 68).

The characteristics of response classes have varied widely. Researchers have pre-selected and reinforced discrete responses, such as numbers (39), nouns and verbs (31, 40), emotional words (27, 28, 41), to the more natural and molar types which occur in a subject's verbalizations, such as opinions (34) and self-reference statements (35, 42, 43, 44, 45).

**Reinforcing stimuli**.--Reinforcing stimuli have ranged from mechanical, gestural, and payment to some type of verbal reinforcement by the experimenter. In certain circumstances, the following have been found to be reinforcing:

1. **Mechanical**
   
   a. Flashing light (46)
   
   b. Bell tone (47)

2. **Gestural**
   
   a. Head nod (44)
   
   b. Head nod and smile (48)

3. **Payment**
   
   a. Chips exchangeable for candy and cigarettes (49)
4. Verbal
   a. "good" (32, 36, 50, 51, 53)
   b. "mm-hmm" (27, 31, 35, 43, 54, 55)
   c. "right" (26, 49)
   d. "yeah" (35)
   e. "I see" (35)
   f. Paraphrase (34, 45)

Population.--The great majority of subjects were drawn from undergraduates in Introductory Psychology courses and hospitalized patients. Krasner (37) lists subjects in twenty-four studies out of twenty-eight as coming from the previously mentioned categories.

Controls.--Controls in these studies have traditionally been of two types. Either a control group was selected from the same population and was not administered the experimental treatment or the pre-reinforcement set of trials (operant period) was used as the control. A number of studies have added an extinction period to examine the effects of either no reinforcement or random reinforcement following the conditioning period.

Experimenter influence.--A number of studies have set up controls for experimenter influence. Sarason (56: 242), among others, has championed the need for more research on the experimenter influence. His conviction is stated in this way:

These verbal behavior experiments bear on the many studies
that have shown that reinforcement exerts a powerful influence over individuals' utterances and their performance. They show that the agent (the experimenter), who performs the reinforcing operating, or who just listens, is of substantial importance.

Binder, McConnell, and Sjohelm (50) studied the effects of experimenter physical characteristics on subjects' conditioning scores using a young, attractive, soft-spoken female for one of the experimenters in the study and an older man, six feet, five inches in height and possessing a commanding personality, for the other. Other studies have manipulated interaction between the experimenter and the subject prior to the experimental session. The set used by Weiss, Krasner, and Ullmann (28) was a hostile-nonhostile interaction between two experimenters and their respective subjects. Kanfer and Karas (57) contrasted praise and criticism interactions before the experimental session.

Three additional variables—schedules of reinforcement, subject personality characteristics, and subject awareness—have all received attention in the verbal conditioning literature and will be treated separately in the sections immediately following due to their pertinence in this study.

Schedules of Reinforcement

The major focus of this study was investigation of the differential effects of schedules of reinforcement on the conditioning and extinction of subject self-reference statements. Although several verbal conditioning studies
have dealt with schedules of reinforcement, none has attempted
to apply schedules to a natural response class, such as the
self-reference statements. The study attempts to experiment
with these variables (i.e., schedules and reinforcement and
response class) in a quasi-counseling setting.

The importance of the scheduling of reinforcement is
apparent when we consider the following explanation by Chaplin
and Krawiec (60: 244).

Let us approach the problem of schedules of reinforcement
by considering the typical situation in a classical condi-
tioning experiment. CS (conditioned stimulus) is pre-
sented followed by US (unconditioned stimulus). During
the period of acquisition, the US is always presented,
and for this reason the reinforcement is continuous. But
Skinner points out that in the operant behavior more
characteristic of everyday life, reinforcement is any-
thing but continuous.

. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
The question immediately arises, which is more effective--
continuous or intermittent reinforcement?

If verbal behavior is amenable to reinforcement pro-
cedures, as demonstrated in reviews on verbal conditioning by
Krasner (37), Salzinger (38), Strong (58), and Williams (59),
is it also possible to demonstrate that differing schedules
of systematic reinforcement have predictable differential
effects on the conditioning and resistance to extinction of
a natural response class?

The research thus far has been mostly concerned with
the reinforcement of what Krasner (61: 72) terms discrete
response classes.

In his review of verbal conditioning studies, Krasner
(1958a) divided the response class into four types of
tasks demanded of the S: saying words or numbers, storytelling and interviews, completing sentences, and test-like situations. In three of these tasks the responses may be considered to be discrete, whereas in the storytelling and interview type of situation . . . there is a continuous flow of conversation. E must be alert to make a discriminative response and must quickly make a number of decisions as to his own behavior.

Two studies using the autokinetic technique compared schedules of reinforcement on verbal behavior.

Kanfer (46) reinforced responses in a 20 per cent range which was established from prior trials with the subject. Two groups were reinforced on a partial basis (50 and 67 per cent), while a third group was placed on a continuous reinforcement basis for the pre-selected responses. The extinction curve results were in keeping with studies of animal behavior by Ferster and Skinner (62). The group reinforced continuously had a steep extinction curve, while the partial reinforcement groups yielded curves which were almost level.

Spivak and Papajohn (26) reinforced correct estimates only and found that continuously reinforced subjects extinguished in ten to thirty-five trials, while a number of subjects placed on a variable interval schedule did not extinguish in ninety trials.

Using Taffel technique, Grossberg (52) compared intermittent and continuous reinforcement groups and found no significant difference in acquisition rate or extinction between the two groups.

Kanfer (46) used Greenspoon's method and reinforced
verbs using three different schedules of reinforcement: fixed ratio, fixed interval, and variable interval. They were reinforced by a light which would illuminate for each correct response occurring at the proper time according to the schedule employed. The results showed that the fixed ratio group exceeded both the intervally reinforced groups during the extinction period. Considering economy of reinforcement, only about one-half as many reinforcements were necessary to maintain a high response rate in the fixed schedules as were necessary in the interval schedules to maintain an equivalent rate.

The rate of verbalization in an eighteen-person, discussion-type group was reinforced by McNair (47) using different schedules of reinforcement. The reinforcer was a bell tone which denoted approval. McNair concluded that increased verbalization varied with the schedule of reinforcement employed.

The need to study a more molar type of response class (e.g., self-reference statements) in a continuous flow of subject verbalization is clear. As Raimy (63), Rogers (43) Adams and Hoffman (42), and Sarason (44) have hypothesized, the self-reference unit has relevance for counseling and psychotherapy and as Salzinger (38: 82) states, "More research is needed in this [schedules of reinforcement] area to deal with verbal responses occurring during continuous conversation."
Krumboltz (64: 123) among others adds his voice to the need to increment our knowledge of the effects of schedules and includes reference to intrapersonal relations outside of the counseling as well as the counseling setting itself.

Once the counselor becomes aware that his behavior and the behavior of other persons at home and at school may be reinforcing certain behaviors of his client, the question of scheduling these reinforcers becomes important. Various schedules of reinforcement have remarkably different consequences on "persistent" behavior.

Subject Personality Variables

The investigations into subject characteristics have followed two lines of inquiry. One has been the manipulation of some state within the individual and then controlling for its effect on conditioning, and the other is the measurement of personality variables to define operationally subject characteristics.

In an example of the first type, Hall (65) manipulated the instructional set before the experimental conditioning period. He gave one group ego-oriented instructions; one, task-oriented instructions; and a third group, no instructions. All groups conditioned, but to differing degrees; and Hall concluded that this could be attributed to the instructional set. Other induced pre-trial conditions that have been studies are hostile and nonhostile interactions by Weiss and Ullmann (66) and task relevant information by Kanfer and
The second method of investigation related to subject characteristics has most often attempted to control for subject anxiety. The Taylor Manifest Anxiety Scale has been used more than any other scale.

Matarazo, Saslow, and Pareia (32) found conditioning scores and TMAS scores to be independent. They also found that age, sex, word rate, and Wechsler vocabulary scores were not related to conditioning.

The results of the research to date have been rather inconclusive and have led Strong (58: 665) to state in his review: "These findings suggest that very few subject characteristics are related to verbal conditioning." There is certainly adequate evidence that further research is needed. For example, two studies may be cited: one by Taffel (25) in which a significant correlation was found between high anxiety and conditionability; the other by Kanfer and Marston (68) who found significant difference between two scales of the MMPI and the subject's self-reference statements. Further, Sarason (69) found a significant relationship between test anxiety and lack of protection scales and conditionability.

Subject Awareness and Verbal Conditioning

Awareness as a variable in learning has had a long history of controversy in the literature of psychology.
Specifically, in relation to the modification of verbal behavior which has its roots in the writing of Thorndike (70), awareness has been regarded both as a completely necessary and as an unnecessary concomitant of verbal conditioning. Skinner (71), whose operant conditioning paradigm serves as a model for much of the present work in verbal conditioning, has stated that awareness is not necessary for learning but may or may not be a concomitant with learning. Representing the other end of the continuum, Dulaney (33) has stated that the acquisition of a verbal response occurs through the mediation of an associative hypothesis on the part of the subject, connecting the response class being conditioned and the generalized reinforcer. Dulaney's conclusions imply that awareness on some level is always a factor where the conditioning effect is observed.

The early studies in verbal conditioning employing the operant conditioning paradigm did not investigate the variable of awareness, but the more recent studies in the field have identified it as an important variable that must be considered. Whether stated directly or only implied, verbal conditioning research had heretofore communicated learning without awareness; and this position is being challenged.

Some of the intricacies involved in the problem are identified by researchers in the verbal conditioning area. Salzinger (38) identifies three alternatives: (a) a subject can be aware of the reinforcer but not of the response; (b)
he may be aware of the reinforcement and the response and the contingency; or (c) he may be aware of neither. Kanfer (72) points out the temporal dimensions of the problem when he calls attention to the possibility that one could be unaware during the experimental session and become aware during a post-session assessment for awareness. Related to Kanfer's observation, Sarason (73: 303) makes reference to the possibility of lengthy post-experimental session awareness tests cueing the subject as to the relationship between reinforcement and response class. Krasner (74: 295) points out that, if the task involved is simple in nature, this is conducive to the subject's becoming aware. Other variables likely to be related to the subject's awareness are the type of reinforcer and the schedule of reinforcement.

In his 1958 review, Krasner (37) stated that only 5 per cent of the subjects involved in thirty-one of the studies employing the operant conditioning paradigm were aware.

Some investigators found that awareness, when it occurred, did not influence the subjects' rate of learning verbal responses--Sidowski (75), Verplanck (34), Eriksen and Kuethe (76), and Nuthmann (77). Other investigators found little or no awareness in their subjects--Cohen (51), Greenspoon (31), Hartman (78), McNair (47), Spivak and Papajohn (26), Taffel (25), and Wickes (48).

It should be noted that all of the studies referred
to thus far would be classified as the earlier studies of the operant conditioning of verbal behavior. In 1961 Dulaney (33) challenged the viewpoint that learning took place without awareness and hypothesized that all that verbal conditioning may eventually turn out to be is human problem-solving. When Dulaney categorized his subjects into groups labeled (a) reinforcement for association, (b) associative hypothesis alone, and (c) no associative hypothesis, it was found that the first group showed a highly significant learning effect; the second, a modest one; and the third did not differ from the control group.

Matarozzo, Saslow, and Pareis (32) selected human responses and plural nouns as their response classes. Neither E in the experiment successfully conditioned plural nouns whereas both Es successfully conditioned human responses. The research found conscious awareness present in the groups that conditioned significantly and concluded it was a concomitant with conditionability. They assessed awareness with a two-question, open-ended questionnaire rated on a four-point scale.

Levin (79), employing a lengthy interview, concluded that no awareness was shown after the first four questions which resembled the questions asked in previous studies. However, after a lengthy interview session, those subjects who conditioned showed awareness.

Spielberger, Levin, and Shepard (80) found similar
results in a study of forty-five female undergraduates in psychology.

DeNike (81) attempted to resolve the temporal difficulty by assessing for awareness after each segment. He found that only subjects who could evidence the awareness component conditioned significantly.

Considering the equivocal nature of the research thus far and the many aspects of the experimental situation now being recognized as germane and necessary in the study of awareness, the need for additional investigation is evident.
Notes to Chapter II


CHAPTER III

METHODS AND PROCEDURES

Subjects

The population for this research was a group of 169 female undergraduate students majoring in Education at the University of Massachusetts. The investigator spoke to the students in their classes and asked them to assist as counselees in the training of a group of graduate students in a counseling practicum course. The students were told that they would be called in for one session, which would last no more than one-half hour. They were also asked to volunteer to take a personality test.

Immediately following the explanation of this request, forms (see Appendix A) were passed out to the students which were designed to enable them to indicate their free periods. If they had preferential periods in regard to the time of the session, they were asked to indicate these with an arrow and a note to this effect. These schedule forms were on the second page of a two-page handout; the first page, signed by the Assistant Dean of the School of Education, was a cover letter soliciting their cooperation. Other necessary identifying information was allowed for on the second page (i.e., name, address, etc.; also, they were excused from
participation if they checked the appropriate block on the second page).

A random sample of seventy-five was drawn from the tested group, which numbered 187 (two students withdrew). An additional twelve students were randomly selected to comprise a standby group in the event that volunteers among the initial seventy-five were ultimately unable to attend a scheduled session.

The students were told that they would be contacted as to the date and time of their appointments. Subsequent to this meeting, the students were informed of their appointments in a second letter signed by the Assistant Dean of the School of Education (see Appendix B). To insure smooth scheduling, each student was contacted the evening before her scheduled session by phone. The experimental sessions began Thursday, October 27, 1966, and ended on Friday, December 16, 1966.

Experimenters and Research Personnel

Three experimenters were used in this study to insure that results obtained would not be artifacts of one experimenter's influence. The principal investigator was not one of the experimenters.

Two of the experimenters were twenty-four years of age and had similar educational backgrounds. Both of these Es (E1 and E2) were graduate students in the Guidance and Counseling Master's Degree program at the School of Education.
of the University of Massachusetts. The remaining experimenter (E3), who was twenty-six years of age, was a Doctoral candidate in the above-mentioned program.

Four additional research assistants served in the project. These people (one graduate student in Guidance and Counseling and three undergraduates) acted as monitors, technical assistants, and made most of the reminder telephone calls.

The Design

As stated in the previous section, the experimental design utilized three experimenters. Each experimenter was assigned twenty-five subjects, bringing the total number of subjects in the experiment to the previously stated seventy-five. Five different schedules of reinforcement were tested by each experimenter with the twenty-five subjects being divided into five equal cells of five.

Within each of the five schedules tested, each session for all subjects was divided into three procedures termed the operant, conditioning, and extinction levels.

A diagram and key for the experimental design is as follows:

<table>
<thead>
<tr>
<th></th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>C</td>
<td>E</td>
<td>O</td>
<td>C</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E1</td>
<td>n=5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E2</td>
<td></td>
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<tr>
<td>E3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N=75</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Experimenter Designations

E₁ Experimenter #1
E₂ Experimenter #2
E₃ Experimenter #3

Treatment Designations

T₁ Fixed Interval Schedule of Reinforcement
T₂ Variable Interval
T₃ Fixed Ratio
T₄ Variable Ratio
T₅ Continuous

Procedure Designations

O Operant Level Segment
C Conditioning Segment
E Extinction Segment

In addition to each of the foregoing three procedures, each experimental session had an opening and closing segment. The opening segment served the purpose of preparing the subject for the experimental session, and the closing allowed the experimenter to bring the session to a smooth closing and administer a test to assess the subjects' awareness of the purpose of the session.

A diagram depicting the total session to which each subject was exposed is as follows:
**EXPERIMENTAL SEGMENT**

<table>
<thead>
<tr>
<th>Opening</th>
<th>Operant Level</th>
<th>Conditioning Level</th>
<th>Extinction Level</th>
<th>Awareness Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untimed</td>
<td>Random Rein.</td>
<td>Treatment</td>
<td>Random Rein.</td>
<td>Untimed</td>
</tr>
<tr>
<td></td>
<td>6 min.</td>
<td>6 min.</td>
<td>6 min.</td>
<td></td>
</tr>
</tbody>
</table>

**Data Collection**

The analysis and counting of subject self-references were confined to the three segments of the experimental session. All sessions and all segments of sessions were taped during the process of the study.

**Operant Level**

The first of the three procedures was the operant level in which a base rate of the subject's self-reference statements was established. It is important to note that this segment served as the control in the experiment against which the subject's conditionability was measured.

**Conditioning Level**

Temporally, this procedure followed the operant level and in it the subject's self-reference statements were enumerated to aid in the establishment of a conditioning score. It was this number of the subject's self-reference
Extinction Level

The third and final segment which constituted those conditions designated procedures was the extinction level. Once again, the data collected in this segment were the number of subject's self-reference statements. This total was contrasted with the conditioning score to yield an extinction or resistance to extinction score.

Analysis and Counting of Self-references

The criteria for a self-reference statement were that it contain one of the personal pronouns mentioned in Chapter I (Definition of Terms), a verb, and a predicate. The self-references were analyzed and counted by the investigator and one of the experimenters in the study (E3). The self-reference statements were assessed over the three procedures in thirty-second time intervals. As stated previously, each procedure was six minutes in duration; consequently, each procedure yielded twelve scores (six minutes; a score for each one-half minute) and a total score. An analysis and an enumeration carried out in this manner make the data conducive to trend and graph presentation.

Throughout the analysis, the two raters were seated in a room listening to the taped interviews and making their
own independent tallies. If discrepancies arose that could not be accounted for upon minimal investigation, the taped section was replayed.

The Personality Test

The Sixteen Personality Factor Questionnaire (1) was utilized in this experiment. This test is a factor analytically developed instrument published by the Institute for Personality and Ability Testing. Six forms of the tests are available (A, B, C, D, E, and F). Two equivalent forms (A and B) were used in this investigation.

Reliability and validity.—Split-half reliabilities for each of the sixteen factor scales range from +.71 to +.93, averaging about +.83 or +.84. Internal construct validities range from +.73 to +.96, averaging approximately +.88.

The sixteen personality dimensions are described on a low to high continuum appearing below. The low-scoring description appears on the left and the high on the right.

Factor

<table>
<thead>
<tr>
<th>Factor (Factor)</th>
<th>Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Reserved</td>
<td>detached, critical, cool</td>
</tr>
<tr>
<td>B</td>
<td>Less Intelligent</td>
<td>concrete-thinking</td>
</tr>
<tr>
<td>C</td>
<td>Affected by Feelings</td>
<td>emotionally less stable, easily upset</td>
</tr>
</tbody>
</table>

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<td>C</td>
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<td>emotionally less stable, easily upset</td>
</tr>
</tbody>
</table>
Humble
mild, obedient, conforming

Sober
prudent, serious, taciturn

Expedient
a law to himself, bypasses obligations

Shy
restrained, diffident, timid

Tough-minded
self-reliant, realistic, no-nonsense

Trusting
adaptable, free of jealousy, easy to get on with

Practical
careful, conventional, regulated by external realities, proper

Forthright
natural, artless, sentimental

Placid
self-assured, confident, serene

Conservative
respecting established ideas, tolerant of traditional difficulties

Group-dependent
a "joiner" and good follower

Casual
careless of protocol, untidy, follows own urges

Assertive
independent, aggressive, stubborn

Happy-go-lucky
heedless, gay, enthusiastic

Conscientious
persevering, staid, rule-bound

Venturesome
socially bold, uninhibited, spontaneous

Tender-minded
dependent, over-protected, sensitive

Suspicious
self-opinionated, hard to fool

Imaginative
wrapped up in inner urgen- cies, careless of practical matters, bohemian

Shrewd
calculating, worldly, penetrating

Apprehensive
worrying, depressive, troubled

Experimenting
critical, liberal, analyti- cal, free-thinking

Self-sufficient
prefers own decisions, resourceful

Controlled
socially precise, self-disciplined, compulsive
Relaxed: tranquil, torpid, unfrustrated
Tense: drive, overwrought, fretful

In addition to the listing of the sixteen primary factors, four composite second-order scores may be derived from this personality inventory. The second-order factors are computed from combinations of the primary factors and are as follows:

Anxiety: The score shows the level of anxiety in commonly accepted sense, which may be either manifested for normal situational reasons or may be neurotic in origin, correlated with psychiatric evaluations of anxiety level.

Extraversion vs. Introversion: A high score indicates a socially outgoing, uninhibited person, good at making contacts, while the low score indicates an introvert, both shy and self-sufficient.

Tough Poise vs. Responsive Emotionality: High "tough poise" scores indicate an enterprising, decisive, imperturbable personality. The low score points to a person more deeply emotionally sensitive, guided by emotions, and liable to more frustration and depression.

Independence vs. Dependence: High scores betoken an aggressive, independent, self-directing person; low scores, a group-dependent, agreeable, passive personality.

The foregoing sixteen primary factors and four second-order factors were compared with the subject's conditioning scores to establish possible relationships between these operationally defined personality traits and conditionability.

The Awareness Test

The awareness test (see Appendix C) was administered
orally by the experimenter following the experimental seg-
ment. The test was structured so that further questioning
and nondirective probes by the experimenter would be contin-
gent on the answers given by the subject. The level of the
subject's awareness was assessed against criteria closely
resembling those presented in a study by Matarazzo, Saslow,
and Pareis (2).

Each taped awareness test was evaluated by two judges
working independently (two of the research staff) and indi-
cating one of four levels of awareness as the subject's
awareness score. A high level of correlation was established
between the judges' ratings of the awareness scores.

Treatment of the Data

The design of this research focuses upon variables
that might answer questions that prompted the research. In
this research, questions were asked about the effectiveness
of an experimenter's using operant conditioning techniques
in bringing about a change in a subject's self-reference
statements. Further, a question was being asked about the
number of systematic intermittent schedules of reinforcement
and their differential effects on the subject's self-
references. Also, the question of the relationship of cer-
tain personality traits to a subject's conditionability was
probed.

To answer questions about the variables involved in
the experimental session, analysis of variance designs were employed to determine the significance of differences due to five schedules of reinforcement, the three experimenters, and the procedures. This type of approach also allowed a check on the interaction of the above variables.

A multiple regression approach was used to compare the personality dimensions with the subjects' conditioning scores.

Procedures

Pilot Study

A pilot study was conducted immediately prior to the beginning of the principal investigation. This study was utilized to complete the training period of experimenters and monitors, to check the equipment to be used, and to make a number of determinations about the experimental setting.

Before the study began, the experimenters listened to tapes on which a counselor continuously reinforced the self-reference statements of a subject. The reinforcer used on these tapes was "mm-hmm" and a positive head nod. The counselor reinforced the pronouns immediately following the subject's emission of the pronoun. The experimenters also participated in discussion groups concerning operant conditioning techniques and became acquainted with much of the former research in verbal conditioning. As this phase of
the study progressed, experimenters were able to evaluate their own taped sessions as well as those of the other experimenters in the study.

The subjects were drawn from the freshmen and sophomore classes at a nearby community college and were fourteen in number. This allowed each experimenter to have at least four preliminary sessions before the main study. The experimenters used a standardized opening and tested the effects of predetermined procedures in each segment of the experimental session. Immediately following the session, an awareness test was employed.

Due to findings established during this pilot phase, certain important procedural changes were made to afford more rigor in the main investigation.

The Main Study

Setting

When the subjects arrived for their scheduled appointments, they were met by a member of the research staff and taken to the counseling room. This was a small, comfortably furnished room that allowed for the privacy necessary in the experiment.

The experimenters repeated the rationale for the session (i.e., the experimenters were graduate students in a course in practicum counseling and the students were to act the part of counselees) to increase the face validity of the
session. Krasner (3: 217) identifies face validity as an important consideration in the following statement:

The free operant task is usually presented in a somewhat disguised form. It should have a role of face-validity to it; it must make sense as an experimental task as stated or the subject will attempt to hypothesize a real "meaning" to it.

Following the introduction, the experimenter asked each subject to talk about anything she would like for a period of about fifteen minutes. The subject was told that the experimenter would speak very little during the fifteen minutes and would not ask or answer any questions. The experimenter accounted for this novel situation by explaining that he and others in the counseling course were disciplining themselves to listen as attentively as possible to counselees. It was further explained that they (the experimenters) did not want to influence the drift of a subject's verbalizing by interrupting and asking questions.

Subsequent to this direction, the experimenter conversed with the subject until he felt sufficient rapport had been established to begin the experimental session. He would then ask the subject if she was ready and, if the answer was affirmative, this would mark the beginning of the experimental session. If the answer was negative, an extension of the opening period was necessary to afford more time to help the subject feel at ease. Once again, the subject would be asked if she was ready to begin and, if affirmative, the answer would signal the beginning of the session.
During the experimental session, the experimenter was permitted to use nondirective probes if the subject had stopped talking and seemed uncomfortable. These interjections by the experimenter were kept to a minimum and occurred in no more than one-fifth of the sessions.

Monitors and Apparatus

To enable the experimenter to focus on the subject and simulate listening and attentiveness, it was necessary to place the task of timing the segments and spacing reinforcement cues on monitors. The monitor and an assistant were situated in a room adjacent to the counseling room throughout each session in the study.

Tape recorders.—A VM 737 stereo tape recorder was placed in the monitoring room to record the entire experimental session. The Channel A microphone to this set was concealed in the counseling room, while the Channel B microphone was utilized in the monitoring room to superimpose proper experiment designations on the tape and to record buzzer signals ending each segment.

A Wollensak monoral tape recorder was used to allow the monitor to listen to the counseling session. The monitors used standard monoral headsets. A microphone to this recorder was also concealed in the counseling room. This was necessary for scheduling reinforcement and beginning the operant segment, which was effected by mutual consent of the
experimenter and the subject and not the monitor. This set was also wired to perform the duties of the stereo set in case of breakdown.

Light cues.--Concealed in a plant in the counseling room were a red and a green light. The former was designated the period cue and the latter the stimulus cue. The plant was placed behind and over the left shoulder of the subject to allow the experimenter to see the cues in a peripheral manner while keeping his gaze focused on the subject. The lights were operated by the monitors in the next room from a keyboard, which included duplicate lights to insure proper cueing in the counseling room and controls to operate the lights.

Time clock.--A testing time clock was utilized in the timing of segments. The monitor reset the clock after each six-minute segment. The clock was equipped with a buzzer that signaled the end of each session.

Stop watch.--A stop watch was operated by the monitor to insure proper timing of random cues during the operant and the extinction segments and the various schedules of reinforcement during conditioning.

Scheduling Reinforcement

From the beginning to the end of the experimental portion of the session, the experimenter emitted reinforcers at different rates according to (a) the procedure involved
and (b) the treatment or schedule of reinforcement under study. A description of the methodology involved in the monitoring of the response class, the cueing of the experimenter, and the experimenter's emission of reinforcements is presented in the following sections on procedures and treatments.

**Procedures**

**Operant level (six minutes).**--This procedure began with the cue from the experimenter when he said, "All right then, let's begin." It was at this time that the monitor corroborated the beginning by activating the red stimulus cue to assure the experimenter that the signal had been received and the timing of the operant level was starting. During this segment, the experimenter was signaled with the green stimulus cue as to when to emit the reinforcer. The monitor followed a limited random schedule that had been prepared, using a mean of twenty-five seconds.

**Conditioning segment (six minutes).**--The treatments involved were applied during this segment. Proper scheduling of reinforcement was controlled by the monitor operating the timing clock, stop watch, and stimulus cue. The intricacies of this procedure will be detailed in the section on schedules of reinforcement.

**Extinction segment (six minutes).**--Although the random reinforcement schedule utilized in the operant level was also
used in this procedure, it was somewhat modified. To effect an extinction effect on the response class under study, the experimenter, upon receiving a green light cue to emit a reinforcer, delayed its use if it occurred at the time of the self-reference made by the subject. The reinforcer was then applied as soon after the cue and the cessation of a subject self-reference as possible.

**Treatments or Schedules of Reinforcement**

**Fixed ratio.**—The ratio schedule decided on after the pilot study data were analyzed was the reinforcement of every third self-reference pronoun emitted by the subject. The monitor counted the subject's emission of the pronouns designated in Chapter I and signaled the experimenter with the stimulus cue at every third pronoun. The experimenter responded immediately to the cue with the reinforcer.

**Variable ratio.**—A number of schedules drawn from a table of random numbers (4) around a mean value of three were used as the basis for this treatment. The monitor would signal the experimenter to emit a reinforcer as guided by the random schedule in use during the session.

**Fixed interval.**—Once again, data from the pilot study were relied on. On the basis of self-reference pronouns emitted, it was determined that the last ten seconds of every thirty-second period would be the interval in which reinforcement was dispensed. The monitor, using the stop watch to
insure accurate timing, would activate the stimulus cue (green light) for a ten-second duration after every twenty-second interval. The experimenter, seeing the green light, would reinforce the subject for every emission of the response class during this interval. No reinforcement at all would be dispensed during the intervening twenty-second intervals.

**Variable interval.**—The variable interval schedule, using the same base as the fixed interval (i.e., ten seconds of reinforcement in every thirty), was varied randomly around a mean of three. The segment in which the response class is reinforced is once again a continuous ten-second interval but, rather than the non-reinforcement space between being fixed at twenty seconds as in the previous schedule, it fluctuated from zero to fifty seconds.

**Continuous.**—In this schedule, every member of the response class is reinforced. The pilot study enabled the investigator and the experimenters to determine that the monitor's help in cueing the experimenter was not necessary. It was found that, in the case of continuous attending to the pre-selected pronouns, the experimenter, who was seated facing the subject, could reinforce more effectively than waiting to be signaled by the monitor. It is important to note in this schedule that there is no counting or timing involved in the relationship of reinforcer to the response class involved.
Response Class and Timing of the Reinforcer

The response class has already been defined and referred to in several instances in this presentation; however, further clarification is necessary. In the definition of terms in Chapter I, the class is said to be those statements containing "I, my mine, me, myself, we" and sometimes indefinite pronouns like "one" and "you." The analysis and counting of self-references were performed in terms of statements. More specifically, a verb and a predicate were necessary in addition to one of the above pronouns for the utterance to qualify as a self-reference statement.

This rule for the analysis did not apply to the live session application of the stimulus reinforcer. For the conditioning period, the reinforcer was applied to each and every above-mentioned pronoun whenever they were emitted by the subject. The experimenter was about the business of reinforcing the utterance of the pronouns then and not waiting for a bona fide self-reference statement, as was done in the analysis of the data. This methodological approach was an arbitrary decision on the part of the investigator to circumvent the difficulty encountered in other studies dealing with a continuous verbalization context. The concentration on the pronouns eased the burden of the monitors and the experimenters, and it was reasoned that pronouns such as those
selected in this study seldom occur except in the context of a self-reference statement.
Notes to Chapter III


CHAPTER IV
ANALYSIS AND INTERPRETATION OF THE DATA

This chapter reports the results of several analyses utilized to complete the inspection of the data derived from the experiment. Four primary sets of data were subjected to analysis: (a) the number of self-references emitted under conditioning (schedules of reinforcement) as compared to the baseline number of self-references (operant level), (b) the number of self-references occurring during the extinction period as compared with the number in the conditioning period, (c) a comparison between a subject's conditioning scores and assessed awareness level, and (d) the relationship between each subject's conditioning score (or conditionability) and her scores on the Sixteen Personality Factor Questionnaire.

The $p<.05$ level of significance was selected for all hypothesis testing which included (a), (b), and (c) above. The $p<.10$ level was utilized in analysis (d), which took the form of hypothesis seeking.

Before any of the above data (a, b, c, and d) were examined, an analysis was made of the operant level which served as the control for the study. As previously reported, during the general explanation given by the E at the beginning of each experimental session, the Ss were instructed to talk about "anything you would like." This instruction
brought about an inordinate number of self-references at the beginning of the operant-level segment. In effect, the instruction caused the Ss to introduce themselves at the beginning of the session, thus accounting for the disproportionate number of self-reference statements. If this condition were to prevail, the operant level, which was used as the control for the study, would account for a spuriously large number of self-reference statements against which to measure subsequent treatments. For this reason, a special analysis was performed on the operant level which is reported in the following section.

**Free Operant Level Analysis**

Most verbal conditioning studies have designated the first segment of the experimental session, which occurs prior to the conditioning segment, as the control for the study. The designated unit of measurement in these studies has been the frequency of a response class as this allows an analysis of the response class over the duration of the experimental session. The three segments in this study were compared to establish two scores:

 Conditioning Scores

\[
CS = \frac{CL - BR}{BR}
\]

CS = Conditioning Score
CL = Conditioning Level
BR = Base Rate

The conditioning score, established with the above
formula, compared the number of self-reference statements occurring in the operant segment with the number in the conditioning segment. The conditioning score represented a percentage-of-increase score.

**Extinction Scores**

\[ ES = \frac{CL - EL}{CL} \]

- \( ES \) = Extinction Score
- \( CL \) = Conditioning Level
- \( EL \) = Extinction Level

The self-reference unit was again measured at each level and a percentage-of-decrease score was obtained.

The analysis of the free operant period was carried out before the computation of the above percentage of increase, decrease scores, and other statistical tests were performed. This design was a one-factor analysis of variance with repeated measures (105-111) on the seventy-five subjects. Self-reference statements were counted for the entire experimental session in thirty-second intervals, which enabled the operant level to be investigated in six, one-minute segments. The question to be answered by this approach was: Do the opening minutes differ significantly from the remainder of the operant level? Table 1 reports the means and standard deviation for the operant-level segment.

Table 2 presents a summary of the analysis of variance, using repeated measures to test the null hypothesis that no difference exists between the means of self-references
### TABLE 1
MEANS AND STANDARD DEVIATIONS OF SELF-REFERENCE STATEMENTS FOR SIX, ONE-MINUTE SEGMENTS OF OPERANT PERIOD

<table>
<thead>
<tr>
<th>Minutes</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>s</td>
<td>4.04</td>
<td>3.95</td>
<td>4.26</td>
<td>4.34</td>
<td>4.91</td>
<td>4.77</td>
</tr>
</tbody>
</table>

### TABLE 2
ANALYSIS OF VARIANCE FOR SELF-REFERENCE STATEMENTS AMONG SIX, ONE-MINUTE SEGMENTS OF OPERANT PERIOD

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between subjects</td>
<td>74</td>
<td>54.9655</td>
<td>4.523*</td>
</tr>
<tr>
<td>Within subjects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Segments</td>
<td>5</td>
<td>74.8396</td>
<td>6.155*</td>
</tr>
<tr>
<td>Residual</td>
<td>370</td>
<td>12.1585</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>449</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p = <.05

Significant at the .05 level when tested against 1 and 74 degrees of freedom to compensate for lack of independence between treatment means.
emitted during each of the one-minute segments of the operant period.

It is apparent in Table 2 that a significant F statistic was derived, indicating that at least one of the minutes differs significantly from the other minutes in the operant level. To make a determination as to which minute or minutes yielded the significant F, a Newman-Keuls (1: 80-85) test of difference between the means was performed on the means of the minutes. This test determined that the mean of the first minute differed significantly (p<.05) from the means of each of the other five minutes.

This analysis of variance showed that the number of self-reference statements made during the first minute was disproportionately large. A correction was made by averaging the last five minutes of the operant level and substituting this average-per-minute score in place of the original score obtained in the first minute. The formula,

\[ CFM = \frac{\bar{X}_{M2} + \bar{X}_{M3} + \cdots + \bar{X}_{M5}}{5} \]

where CFM is the corrected first minute and \( \bar{X}_{M} \) is the mean of the minute segments, was used to obtain the average.

All subsequent analyses on the self-reference statements were performed using this corrected first minute in place of the obtained first-minute self-references.
The Main Analysis:
Self-reference Statements in the Experimental Session

In the analysis of the three segments of the experimental session, two, two-way, analysis-of-variance designs were employed (2: 213-226). These approaches were identical 3x5 computations on the conditioning scores (percentage of increase in self-reference statements in the conditioning segment over the operant segment) and extinction scores (percentage of decrease in self-reference statements from the conditioning segment to the extinction segment). These designs permitted examination of conditioning and extinction scores for each treatment, each experimenter, and the interaction between the two.

The following statistical null hypotheses were tested:

1. There are no differences in conditioning scores among the treatment groups.

2. There are no differences in conditioning scores among the experimenters.

3. No interaction effect exists between treatments and experimenters for conditioning scores.

4. There are no differences in extinction scores among the treatment groups.

5. There are no differences in extinction scores among the experimenters.

6. No interaction effect exists between treatments and
Results—Conditioning Scores

Table 3 summarizes the means and standard deviations for each treatment and each experimenter. Also, total means and standard deviations will be found.

The analysis of variance summary for conditioning scores appears in Table 4. On the basis of this analysis, it was concluded that verbal conditioning did not occur for one or more of the schedules of reinforcement (treatments). When experimenters were combined under each of the following schedules of reinforcement: fixed interval, variable interval, fixed ratio, variable ratio, and continuous, none of the schedules reached a statistically significant level. It was also determined that none of the experimenters had an overall conditioning effect with his schedules of reinforcement. On the basis of this information, null hypothesis #1 (that there are no differences in self-reference statements among the means of the groups exposed to the five treatments) and null hypothesis #2 (that there are no differences in self-reference statements among the means of the groups exposed to the three experimenters) could not be rejected. The analysis of variance does, however, designate a significant interaction effect between treatments and experimenters. On the basis of this, we reject null hypothesis #3 (that there was no interaction effect between
## TABLE 3

MEANS AND STANDARD DEVIATIONS OF SELF-REFERENCE STATEMENTS FOR TREATMENTS AND EXPERIMENTERS OF CONDITIONING SCORES*

<table>
<thead>
<tr>
<th>Fixed Interval</th>
<th>Variable Interval</th>
<th>Fixed Ratio</th>
<th>Variable Ratio</th>
<th>Continuous</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T_1$</td>
<td></td>
<td>$T_2$</td>
<td></td>
<td>$T_3$</td>
<td></td>
</tr>
<tr>
<td>$E_1$</td>
<td>-8.29</td>
<td>1.58</td>
<td>-19.33</td>
<td>5.23</td>
<td>8.01</td>
</tr>
<tr>
<td>$E_2$</td>
<td>.67</td>
<td>2.72</td>
<td>4.07</td>
<td>.79</td>
<td>-12.22</td>
</tr>
<tr>
<td>$E_3$</td>
<td>1.01</td>
<td>2.68</td>
<td>54.77</td>
<td>2.45</td>
<td>-10.19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>-2.65</strong></td>
<td><strong>2.25</strong></td>
<td><strong>13.17</strong></td>
<td><strong>4.47</strong></td>
<td><strong>-4.53</strong></td>
</tr>
</tbody>
</table>

*The conditioning score is a percentage of increase score found by subtracting the self-reference statements obtained in the operant period from those obtained in the conditioning period and dividing by the operant period self-references. A negative sign indicates that self-references dropped in the conditioning period in relation to the operant period.
TABLE 4
ANALYSIS OF VARIANCE FOR CONDITIONING SCORES
FOR FIVE TREATMENTS BY EXPERIMENTERSTABLE

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Among treatments</td>
<td>4</td>
<td>.1275</td>
<td>1.4120</td>
</tr>
<tr>
<td>Among experimenters</td>
<td>2</td>
<td>.1205</td>
<td>1.3344</td>
</tr>
<tr>
<td>Interaction</td>
<td>8</td>
<td>.2207</td>
<td>2.4440*</td>
</tr>
<tr>
<td>Error</td>
<td>60</td>
<td>.0903</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p = < .05

treatments and experimenters) and conclude that verbal conditioning did take place under at least one schedule and with at least one experimenter.

A simple effects test (1: 236-239) was chosen to break down the interaction found between treatments and experimenters. The summary is reported in Table 5.

The significant F was for experimenter #3. This finding indicates that this experimenter was the only one among the three in the study who achieved a significant conditioning effect with one or more of the treatments under investigation.

To examine the differences between treatment means for E3, a Newman-Keuls test of differences between means was once utilized. The results of this test showed that the variable interval (T2) schedule of reinforcement differed
TABLE 5

ANALYSIS OF VARIANCE OF SIMPLE EFFECTS OF TREATMENT COMBINATION MEANS FOR THREE LEVELS OF EXPERIMENTER VARIABLE

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatments for E_1</td>
<td>4</td>
<td>.0502</td>
<td>.5559</td>
</tr>
<tr>
<td>Treatments for E_2</td>
<td>4</td>
<td>.1418</td>
<td>1.5703</td>
</tr>
<tr>
<td>Treatments for E_3</td>
<td>4</td>
<td>.3771</td>
<td>4.1760*</td>
</tr>
<tr>
<td>Error</td>
<td>60</td>
<td>.0903</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p = < .01

significantly from the other four treatments. No other treatment showed a significant increase in conditioning scores for this experimenter.

Results--Extinction Scores

The extinction scores, or the percentage of decrease in self-reference statements from the conditioning period to the extinction period, were submitted to the same statistical analysis as the conditioning scores. The means and standard deviations for extinction scores over treatments and experimenters are summarized in Table 6. Total means and standard deviations for treatments and experimenters are also found in Table 6.

The analysis of variance summary table for treatments
<table>
<thead>
<tr>
<th>Fixed Interval</th>
<th>Variable Interval</th>
<th>Fixed Ratio</th>
<th>Variable Ratio</th>
<th>Continuous</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$T_1$</td>
<td>$T_2$</td>
<td>$T_3$</td>
<td>$T_4$</td>
<td>$T_5$</td>
<td></td>
</tr>
<tr>
<td>$\bar{x}$</td>
<td>$s$</td>
<td>$\bar{x}$</td>
<td>$s$</td>
<td>$\bar{x}$</td>
<td>$s$</td>
</tr>
<tr>
<td>$E_1$</td>
<td>-16.91</td>
<td>2.03</td>
<td>20.91</td>
<td>1.76</td>
<td>-4.80</td>
</tr>
<tr>
<td>$E_2$</td>
<td>10.41</td>
<td>2.76</td>
<td>33.51</td>
<td>1.09</td>
<td>32.91</td>
</tr>
<tr>
<td>$E_3$</td>
<td>24.23</td>
<td>2.14</td>
<td>41.44</td>
<td>2.54</td>
<td>19.56</td>
</tr>
<tr>
<td>Total</td>
<td>5.90</td>
<td>2.80</td>
<td>31.95</td>
<td>1.96</td>
<td>15.86</td>
</tr>
</tbody>
</table>
and experimenters appears in Table 7.

**TABLE 7**

ANALYSIS OF VARIANCE FOR EXTINCTION SCORES
FOR FIVE TREATMENTS BY EXPERIMENTERS

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Among treatments</td>
<td>4</td>
<td>.5813</td>
<td>5.7841**</td>
</tr>
<tr>
<td>Among experimenters</td>
<td>2</td>
<td>.0330</td>
<td>.3284</td>
</tr>
<tr>
<td>Interaction</td>
<td>8</td>
<td>.2262</td>
<td>2.2507*</td>
</tr>
<tr>
<td>Error</td>
<td>60</td>
<td>.1005</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>74</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


On the basis of the analysis presented in Table 7, statistical null hypothesis #4 (that there are no differences among treatments for extinction scores) and the statistical null hypothesis #6 (that there is no interaction effect between treatments and the experimenters) were rejected. Null hypothesis #5, which states that there are no differences in conditioning scores among the experimenters, cannot be rejected.

Once again, a significant interaction between the experimenters and the five schedules of reinforcement (fixed interval, variable interval, fixed ratio, variable ratio, and continuous) prevents us from making statistical conclusions
about the effects of these schedules on extinction scores.

Because this analysis has indicated that there is a significant interaction effect between treatments and experimenters, an additional statistical test was used to uncover the source of the interaction. A simple effects analysis of variance was utilized in this task and the summary of the results appears in Table 8.

**TABLE 8**

ANALYSIS OF VARIANCE OF SIMPLE EFFECTS OF TREATMENT COMBINATION MEANS FOR THREE LEVELS OF EXPERIMENTER VARIABLE

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatments for E₁</td>
<td>4</td>
<td>.4108</td>
<td>4.0875*</td>
</tr>
<tr>
<td>Treatments for E₂</td>
<td>4</td>
<td>.3703</td>
<td>3.6845*</td>
</tr>
<tr>
<td>Treatments for E₃</td>
<td>4</td>
<td>.2520</td>
<td>2.5074</td>
</tr>
<tr>
<td>Error</td>
<td>60</td>
<td>.1005</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p = < .01

As indicated by the summary table, the F statistic for E₁ and E₂ attained significance. Once again, the Newman-Keuls test was employed to examine the treatment means for each of the Es. The results of this test made it possible to see that, with E₁, the subjects' emission of self-reference statements declined quicker after exposure to the
continuous reinforcement schedule \((T_f)\). \(E_1\)'s extinction period decline for the continuous schedule was statistically significant when compared to the fixed interval \((T_i)\) and the fixed ratio \((T_r)\) schedules. Upon examination of the reason for the significant F statistic for \(E_2\), it was found that again self-reference statements declined faster during the extinction period after exposure to the continuous schedule. The obtained mean for self-reference statements for \(E_2\)'s continuous schedule \((T_f)\) was statistically significant when compared to his variable ratio \((T_v)\) mean.

The Awareness Test

Subject awareness was assessed, using four levels of criteria which were arranged on a continuum from no awareness to full awareness. The levels closely resemble those established by Matarrazo, Saslow, and Pareis (3) and used by these researchers in a verbal conditioning study. The four levels are:

1. **No Awareness**
   
   Did not mention response class or the reinforcer.

2. **Aware of Reinforcer**
   
   Identified the reinforcer but did not connect it as reinforcing anything being said.

3. **Aware of Reinforcer (plus)**
   
   Identified reinforcer and indicated it was encouraging something said—or identifies the reinforcer and an incorrect response class.
4. **Aware of Intent of Session**

Identifies reinforcer, response class, and the correct relationship.

The awareness test was administered to each subject at the end of each experimental session by the interviewer. The test was administered orally and, because the subjects demonstrated little or no awareness, all were asked, "Was there anything about me or yourself that you noticed during the interview?" This question was termed "the probing question" (Awareness Test Question #5--Appendix C) for this study and was to be asked only when the subject had not identified either the response class or the reinforcer.

To analyze the taped results of this test, two members of the research staff independently made assessments, utilizing the four-level criteria scale. Their assessments were correlated with the following computational formula (4:328).

\[
r_{12} = \frac{n \cdot Exy - (Ex)(Ey)}{\sqrt{n \cdot Ex^2 - (Ex)^2} \sqrt{n \cdot Ey^2 - (Ey)^2}}
\]

\(r_{12}\) represents correlation between two raters

x = rater number one's scores

y = rater number two's scores

The resulting coefficient of correlation was .90 which indicated a high degree of interjudge reliability regarding awareness-level scores.

A chi-square test was performed to test the relationship between the subjects' awareness-level scores and
their conditioning scores. Those subjects who indicated awareness at levels two to three were dichotomized into conditioners and nonconditioners on the basis of their conditioning scores. Any subject emitting more self-reference statements in the conditioning period than in the operant period was classified a conditioner, and the remainder of the subjects were termed nonconditioners. It was found that an awareness level of two to three could not be said to be associated with conditioning beyond a chance relationship. This conclusion was reached using $2 \times 2$ chi square. The derived $X^2$ of 1.95 did not surpass the table value of 3.84 with one degree of freedom.

The Relationship of Personality Variables to Conditioning Scores

A multiple regression design (5) was used to find the relationship between personality variables and conditioning scores. Beta weights and t-tests of significance for all the independent variables were calculated along with a multiple R for the combination of the variables that the computation designated as significantly related to the dependent variable. The dependent variable in this research was the subject's conditioning score. The independent variables were the twenty personality traits of the Cattell Personality Factor Questionnaire, the sixteen primary factors, and four second-order factors described in Chapter III.
Results

The multiple regression analysis identified two personality variables—artless vs. shrewd and group dependence vs. independence—as being significantly related at the .10 level to the subjects' conditioning scores. Both of these personality traits (which are represented on a continuum from low scores [artless] to high scores [shrewd]) were found to be correlated negatively with conditioning scores. This finding suggests that there is a tendency for subjects who had lower scores on these two personality traits to have higher conditioning scores and vice versa. Artless on factor N and group dependence on factor 4 of the second-order factors were the traits associated with higher conditioning scores.

This examination of the relationship of personality traits and conditioning scores resulted in two personality traits being identified as related to conditioning. However, the two variables together combined for a rather low multiple correlation coefficient of .35.
Notes to Chapter IV


CHAPTER V
SUMMARY, CONCLUSIONS, AND DISCUSSION

This study sought to test the effects of five systematic schedules of reinforcement in a verbal operant conditioning setting. A stimulus condition which was the "mm-hmm" sound and a positive head nod by the E was applied to self-reference statements emitted by the subjects in the study. The longitudinal paradigm employed in the majority of verbal conditioning studies was used in this investigation. This model allows an examination of the effects of treatments (the conditioning period) to be compared to a period immediately before the treatment (the operant period) and immediately following the treatment (the extinction period). A subject's self-reference statements were the units of measurement in this study. These self-reference statements were counted in thirty-second intervals for each of the three experimental periods.

Seventy-five freshmen and sophomore female undergraduates, majoring in elementary education, served as subjects in this study. Each girl was a voluntary subject and also consented to take a paper-and-pencil personality test. This group was drawn from a tested population of 189 volunteers. The seventy-five girls in the final sample were each exposed to one experimental session.
The total sample was divided equally among three experimenters (two Master's Degree candidates and one Doctoral candidate) who administered the five treatment conditions (schedules of reinforcement, fixed interval, variable interval, fixed ratio, variable ratio, and continuous) employed in the study. This resulted in each experimenter working with a total of twenty-five subjects with five subjects under each of the five treatments (schedules of reinforcement) administered.

Signal lights cued the experimenter as to when to emit the reinforcement condition and were operated by a monitor in an adjacent room. The monitor, equipped with a head set, was able to listen to the proceedings in the counseling room and to count self-references to insure proper scheduling of reinforcement. Also, the timing of the total session and the three experimental segments within the session were duties of the monitor. All sessions were taped from beginning to end to permit analysis and enumeration of the pre-selected response class and rating of the subject's awareness level assessed by a test of awareness given at the end of each session.

All of the subjects were administered a personality questionnaire at the beginning of the study. The purpose of this was to be able to determine any possible relationship between a subject's conditioning scores and personality traits as identified by the questionnaire.
Conclusions

The main investigation in this study sought to test the question: Do experimenter reinforcements, when incorporated into different schedules of reinforcement and applied to a subject's self-reference statements (conditioning period) differentially effect the emission of the self-references? A further question to be answered was: Following this reinforcement period (extinction period), are the self-reference statements subject to different patterns of increase, decrease, or stability because they were exposed to one or another schedule of reinforcement? Also, the investigation attempted to determine if there were differences for the experimenters among the five schedules of reinforcement, either for the conditioning period or the extinction period.

It was clearly demonstrated by the tests applied that no schedule of reinforcement among the following five—fixed interval, variable interval, fixed ratio, variable ratio, and continuous—had a significant conditioning effect. Although two schedules, the variable interval ($T_2$) and the continuous ($T_5$), increased the production of self-reference statements, there was a decline in the conditioning effect in the other three schedules. Conditioning occurred to a significant extent with only one experimenter ($E_3$) and one treatment, which was the variable interval schedule ($T_2$).
The results of the treatment effects for the conditioning period were inconclusive.

The extinction period results also failed to show that any one schedule of reinforcement made the self-reference statements significantly more resistant to extinction than any of the others. However, with the continuous schedule (T5), E1 and E2 both had significantly greater extinction effects than a number of their other schedules. The continuous schedule (T5) in this investigation followed the classical patterning of other operant conditioning investigations; i.e., that behavior persists longer after intermittent reinforcement than it does after the response class has been continuously reinforced.

The differences between experimenters reached levels nearly as high as the differences between schedules of reinforcement (Table 4). As previously stated, E3 had a significant conditioning effect with the variable interval schedule (T2). E2 had an overall positive conditioning effect with his continuous schedule (T5) approaching the significance level in this study, but E1's effect on subject self-reference was an overall negative one. Four of E1's schedules (fixed interval, variable interval, variable ratio, and continuous) showed a percentage decrement in conditioning scores.

A second part of this investigation was concerned with the subject's awareness of the purpose of the experiment and how, if present, this awareness affected conditioning.
Subjects attaining awareness levels of two and three as rated by two independent judges were classified as aware. No significant relationship beyond chance could be demonstrated for subjects who conditioned and also attained a two to three awareness level. This conclusion was reached as a result of a 2x2 chi-square test of independence between aware, non-aware, conditioning, and non-conditioning subjects.

In the third phase of this study, which was an examination of the relationship of personality variables to a subject's conditioning scores, it was found that two traits on the Cattell Personality Questionnaire were related to conditioning scores. The traits identified were artless vs. shrewd and group-dependence vs. independence. Due to the fact that these two traits were the only ones resulting in significant t-tests at the .10 level, artless vs. shrewd and group-dependence vs. independence were determined to be related to conditioning scores in the following manner: people who score high on these factors (shrewdness, independence) tend to have low conditioning scores and people who score low in the factors (artlessness, group dependence) tend to have high conditioning scores. The multiple correlation coefficient for these two factors was .35, a finding which indicated that the composite of the two factors, optimally weighted, allowed a predictive efficiency of a rather low 12 per cent.
Discussion

The purpose of the main investigation in this study was to determine the differences among schedules of reinforcement in relation to their conditioning effect on subject self-reference statements. To maximize the efficiency of the efforts to determine the differences among the schedules, the three Es involved in the study were exposed to identical training periods, previously discussed in Chapter III. The purpose was to insure that the three Es would act in as like a manner as possible. The results of this study, although inconclusive in determining differences between schedules, led the investigator to hypothesize that E influence cannot be partialled out. Although the differences between the Es was not statistically significant, there was considerable variability in their efforts to condition subjects; e.g., E₁ had negative conditioning effects in four of the five treatments. The same fluctuations are not present among the Es for extinction scores but, in order to study extinction in relation to conditioning, a conditioning effect must necessarily have taken place. This was not an extremely fruitful area of investigation in this study, as very little conditioning of subjects resulted. However, the fact that the continuous schedule (T₅) attained significance in the extinction period due to the sharp decrease in self-references bears further discussion. This significance was
noted for $E_1$ and $E_2$ and presents some evidence to conclude that human verbal responses, even the more molar types such as the self-reference unit, follow the classical extinction period patterning; i.e., the response is more resistant to extinction following intermittent than continuous reinforcement. Also deserving of our attention is the fact that each $E$ had response-class increases in the extinction segment of the session. $E_1$'s fixed interval ($T_1$) and fixed ratio ($T_3$), $E_2$'s variable ratio ($T_4$), and $E_3$'s variable ratio ($T_4$) extinction period showed an increase in self-reference statements over the conditioning period. Upon first inspection this could be construed as a chance phenomenon but, based on data in a study by Kennedy (1) carried out concurrently and in the same setting, this observation needs more clarification. In the Kennedy study, different stimulus conditions (reinforcers) were applied to self-references in continuous schedules of reinforcement. Not only did each treatment under investigation show a decrease during the extinction period, but a control group which received random reinforcement during each of the periods (operant, conditioning, extinction) decreased in each period from the beginning to the end of the experimental session. In contrast, in the present study each $E$'s continuous schedule ($T_5$) evidenced a decrease during the extinction period, as was the case in the Kennedy study. More pertinent, the Kennedy control group employed a reinforcer highly similar to the type used in this
investigation (mm-hmm, head nod and smile—the smile being the only difference), and the continuous decrease in the Kennedy control group would cause the investigator to ask the question: Why did a number of the groups under various intermittent reinforcement show an increase during the extinction period? A possible answer to this question, though far from conclusive, might be that under the intermittent schedules the reinforcement was beginning to "take hold" at the end of the conditioning period and caused the response class to persist during the extinction period. Further, in studies where the response class has been of the discrete variety, intermittent as contrasted with continuous reinforcement has demonstrated the property of causing the behavior to be more resistant to extinction. It is possible that a class of behavior occurring in continuous verbalization (self-reference statements) could be subject to the same effect.

Very little could be concluded from the data collected in the awareness test and the subsequent $\chi^2$ test applied to determine the relationship between some awareness and conditioning. One important finding does stand out, however; and that is where there was a conditioning effect, little if any awareness was present. The foregoing conclusion is based on the assumption that the awareness test applied in this study could, in fact, identify awareness when present.
In the investigation of personality factors identified by the Cattell Sixteen Personality Factor Questionnaire and conditioning scores, a slight relationship was demonstrated. Factor N (artlessness vs. shrewdness) and second-order factor #4 (group dependence vs. independence) had significant t-tests at the .10 level as one of the steps in the multiple regression analysis. Because all of the Cattell factors are presented on a continuum with traits coinciding with low scores on the left (see above in parentheses) and traits of high scores on the right, the resulting negative correlation indicates the traits at the low end of the continuum. In this study negative correlation coefficients indicating that people scoring low on personality traits N and #4 second-order tended toward high conditioning scores. The factors identified as related to conditioning were artlessness and forthrightness for factor #4 and group dependence and passiveness. It seems that the relationship, though slight, is that a type of naive acquiescence is the subject characteristic related to conditioning.

Final Statement

To study the effect various intermittent schedules of reinforcement have on a class of verbal behavior occurring in continuous conversation is a difficult endeavor. Schedules allow reinforcement only now and then and require a response class to occur with at least minimal frequency
to enable the chosen reinforcer to gain a purchase on the response. Due to this methodological consideration, the task involved or the content of the situation becomes a matter of the utmost importance in researching the effects of schedules. If a schedule never gains a foothold on the response class involved, clearly the differential outcomes in comparing one schedule with another will not yield definitive results. However, the possible differential effects that different schedules might have on a molar response class remain a relevant question for the counseling area.

A recommendation for future research with schedules of reinforcement in a counseling setting follows from the above discussion. The key to making schedules more amenable to study lies in the task in which the investigator engages the subject. What is most germane when attempting to assess the applicability of schedules in this type of setting is that a response class must somehow be occurring at the time reinforcement begins. If the response class has extinguished or dropped to a low level, intermittent reinforcement has very little chance of taking hold. However, if the subject is forced to emit the response class throughout the experimental session (e.g., as in the case of reading word lists or in the Taffel-type tasks), it would seem that this violates that operant model and certainly does not resemble a counseling setting. The task in which the subject is involved, then, should encourage the response class under
study to occur with regularity until such time as the reinforcement begins but not force it to occur throughout the session. This approach would seem to remain within the tolerances of the operant conditioning model.

The future research related to this study would do well to find a task which possesses face validity coupled with a response-class motivator that will cause the class to endure to the point where the reinforcers can take hold. An approach such as this would allow a comparative study of the effects of schedules of reinforcement in a continuous verbalization context to become a more manageable research problem.
Note to Chapter V

APPENDIX A

HANDOUT TO STUDENTS IN SCHOOL OF EDUCATION CLASSES

School of Education
University of Massachusetts

October 18, 1966

Your cooperation is being solicited by the School of Education's Guidance and Counseling Department. Specifically, about one-half an hour of your time is being requested for the purpose of training prospective guidance counselors.

Would you study the TIME PERIOD SCHEDULE on the next page. Then indicate, by marking an "X," those time blocks in which a scheduled counseling interview would be inconvenient.

Your interest and cooperation will be greatly appreciated.

Sincerely,

Ralph R. Pippert
Asst. Dean
School of Education
University of Massachusetts
Name: ____________ (print last name) (first)  
Campus address: ____________________________________________  
Campus phone: ________________________ Age: ___  
What opportunities have you had to be interviewed by a guidance counselor?  
_______ none  
_______ once or twice  
_______ many  
If for religious or other personal reasons you prefer not to participate in this training program, please indicate by checking this box /  
Reason (optional)  

**TIME BLOCK SCHEDULE**

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Dear Mrs. Case and Mr. Dolhenty have informed me that you are willing to assist us in our graduate guidance and counseling training program. Your interest and cooperation are greatly appreciated.

We have been able to schedule your counseling interview for , at o'clock. The interview will last approximately one-half hour. You are requested to report to Miss Liimatainen, the guidance secretary, at Montague House (adjacent to the Sch. of Educ.) at the appointed time. If a previous commitment will prevent you from keeping this scheduled appointment, please inform Miss Liimatainen as soon as possible so that a more convenient appointment can be arranged.

If you have any questions relating to the interview, Mr. Dolhenty, whose office is also located in Montague House, will be willing to assist.

Sincerely,

Ralph R. Pippert
Asst. Dean
School of Education
University of Massachusetts
APPENDIX C
THE AWARENESS TEST FOR REINFORCING
AND SCHEDULES EXPERIMENTS

INTRODUCTION

One of the hypotheses being tested in the Schedules experiment is the relationship between subject awareness of what transpires during the experiment and subject performance. A measure of each subject's "level of awareness" will be obtained by a brief (approx. 4 min.) question and answer period immediately following the Extinction Period.

The questions, or the AWARENESS TEST (AT), will be administered by the E. Essentially, the AT consists of two basis questions plus a probing question which will be employed only when warranted. The answers to these questions will be evaluated on a four-point scale. A simplified description of the scale criteria follows:

1. **No Awareness**
   
   Did not mention response class or the reinforcer.

2. **Aware of Reinforcer**
   
   Identified the reinforcer but did not connect it as reinforcing anything being said.

3. **Aware of Reinforcer (plus)**
   
   Identified reinforcer and indicated it was encouraging something said--or identifies the reinforcer and an incorrect response class.

4. **Aware of Intent of Session**
   
   Identifies reinforcer, response class, and the correct relationship.

AWARENESS TEST PROCEDURES

1. **Period Cue (PC) denoting the end of the Extinction Period.**
   
   a. E looks at his watch and says, "We have run over our time. This for me at least has been a most enjoyable experience."
b. E allows time for the S to emit a brief response.

2. E introduces the test questions.
   a. "Oh, before leaving, I'd like to ask you a couple of questions that would be of great help to me. It's important now that you think back to our interview."

3. QUESTION #1: WHAT DO YOU THINK WAS THE PURPOSE OF THIS INTERVIEW?
   a. If the response is NEGATIVE; i.e., "I really don't know," etc.
      (1) Paraphrase S's statement; i.e., "You really don't know."
      (2) If S still does not offer any type of purpose, then use PROBING QUESTION.
      (3) If S now offers any type purpose (or positive response), go on to Question 2; if not, end interview.
   b. If the response is POSITIVE; i.e., some type of purpose is offered.
      (1) Wait until S has finished and say, "Anything else?"
      (2) When S has finished, move on to Question 2.

4. QUESTION #2: WHAT EVIDENCE DO YOU HAVE FOR THIS?
   a. If response is NEGATIVE; i.e., "I really have no evidence for this."
      (1) Paraphrase the remark; i.e., "You really don't have any evidence."
      (2) Then, if S is still unproductive, follow with PROBING QUESTION.
      NOTE: Do not use Probing Question if it has already been used.
   b. If response is POSITIVE but INCORRECT.
      (1) Allow S to finish and say, "Anything else?"
(2) When S has terminated, ask PROBING QUESTION.

(3) End interview after S's response to Probing Question.

c. If S's response indicates a correct evaluation of the situation (both reinforcement and response class), close interview.

5. THE PROBING QUESTION: WAS THERE ANYTHING ABOUT ME OR YOURSELF THAT YOU NOTICED DURING THE INTERVIEW?

a. If Probing Question is used, allow a response but in no way attempt to follow it up.

b. NOTE: The Probing Question should not be used more than once during an interview.

IMPORTANT CONSIDERATIONS:

1. E should at all times avoid being forced into a position whereby he suggests the nature of the experiment.

2. E should not answer questions directly. If confronted with a direct question, throw it back to the S by saying, "Actually, what I think is unimportant in counseling, it's what you think that really counts."

3. At no time during the AT should the E reinforce S with anything other than attention and the comment, "Anything else?" where appropriate.

4. At no time before, during, or after the interview should the S be confronted with cues that might suggest the intent of the experiment—or that this is, in fact, an experiment. The words "experiment," "study," "doctoral research," etc., should never be mentioned in front of a prospective S until such time as the entire series of experiments has been completed.
BIBLIOGRAPHY


