

THE EFFECTS OF DEGREE OF STRUCTURE OF PARADIGM AND
REINFORCEMENT ON AWARENESS AND VERBAL OPERANT
CONDITIONING OF HOSPITALIZED CHILDREN

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CHAPTER I

INTRODUCTION

Operant conditioning of verbal behavior is one of the most interesting areas under experimental investigation in psychology today. Studies in this area have rich implications for application in both clinical settings and in learning theory. Research and experimentation during the past fifteen years have dealt extensively with verbal operant conditioning. Experimental quality and precision of control, however, have been somewhat inferior in many studies, especially in the areas of certain subject and task variables under consideration.

One subject variable which has received much attention is awareness of the response-reinforcement contingency. Experimental results have generally supported one or the other of two differing views of awareness. Some investigators maintain that conditioning occurs by the direct strengthening effect of the reinforcer. They hypothesize that the subject need not be aware of the connection between response and reinforcement in order to successfully effect behavior modification in the desired direction. Others assert that successful conditioning occurs only when the subject recognizes, or is aware, that reinforcement is dependent upon

a certain response or response class. The issue has become, in part, a series of disparate results obtained from differing theoretical and procedural origins.

Cognitive theorists have generally found support for a predominantly linear trend between awareness and conditioning. Based on deductions from statistical analyses of data, these theorists postulate that the relationship between awareness and conditioning is of a positively increasing nature. Awareness is conceptualized as a hypothetical intervening process directly influencing verbal conditioning performance. Little support has been found for conditioning in the absence of awareness. Proponents of this general position are DeNike (1), Dulany (3), Levin (10), and Spielberger (11, 12, 13).

Studies from a descriptive behavioristic model, however, lend support to a conception of awareness as being of a multidimensional nature. Theorists of this viewpoint do not ascribe to a representation of conditioning and awareness as necessarily positively and unconditionally related. Behavioristic investigators have usually found evidence for conditioning and changes in verbal behavior that are not mediated by awareness. Awareness is dealt with solely as a dependent variable. Many times, data for aware subjects have been discarded prior to statistical analyses. Subscribing to this position are Dixon and Oakes (2), Hersen (5, 6), Krasner and Ullmann (9), and Verplanck (15, 16).

An important task variable pertinent to verbal operant conditioning is the response or response class to be reinforced. Reinforced responses have ranged from those which may be classified as true, free operants to those that are highly structured. In a free operant situation, the investigator has little initial experimental control over a subject's behavior. In verbal operant conditioning, studies based on the Greenspoon paradigm (4) would be considered free operant situations. Greenspoon, in a study that is now thought of as classic in psychological literature, asked only that his subjects "say words." Certain classes of words were then selectively reinforced by a verbal response from the examiner in an effort to make subjects say more words in the chosen category (4, pp. 410-411). Studies following the procedures used in the Taffel paradigm (14), however, show considerably more initial structuring than those based on the Greenspoon method. Taffel required that his subjects construct sentences using a verb and beginning with one of six personal pronouns typed on an index card. Reinforcement was in the form of a verbal response on the part of the examiner, and was given when a subject began his sentence with one of two previously selected pronouns (14, p. 497). The Taffel paradigm, then, places an initial experimental limit on the type of verbalization a subject may emit.

Unfortunately, comparisons of experimental results in verbal operant conditioning have undoubtedly been made

without due respect to the importance of the nature of the response being reinforced. Some investigators (7) believe that awareness may be a partial function of stimulus discriminability. It has been hypothesized by these investigators that, in terms of discriminability, models based on a Taffel (14) design may be more transparent to subjects. In effect, subjects run under a Taffel-type paradigm would be more likely to ascertain, or be aware of, experimental purposes than if they were run under a less highly structured model such as that used by Greenspoon (4).

The present experiment is designed to test certain hypotheses made concerning the nature of conditioning in a verbal operant paradigm, and the relationship of such conditioning with awareness of contingencies. It seems likely that awareness may indeed be some function of discrimination learning (7). If this be true, then a highly structured response class such as that employed by Taffel (4) might be hypothesized to produce more subjects judged to be aware of the crucial response-reinforcement contingency than a relatively obscure response class such as that reinforced by Greenspoon (4). It also may well be that awareness of contingencies is not unconditionally and linearly related to positive gains in performance, or conditioning. This has been the contention of several investigators (2, 6, 9). Dixon and Oakes (2) found that an intertrial color-naming task, used in a Taffel-type paradigm, impeded reports of

awareness but did not significantly affect conditioning. Hersen (6), also investigating the effect of intertrial activity on reports of awareness, found essentially the same phenomenon as did Dixon and Oakes.

As the widely varying results found in the relevant literature attest, the relationship between conditioning and awareness is very likely most complex. Although response class is but one of the major parameters affecting this relationship, it would seem to be an important one. In keeping with the preceding theoretical background, it is anticipated that although a relationship between awareness and conditioning may indeed exist, it is not of as simple or uncomplicated a nature as some studies would seem to purport. One of the purposes of the present research shall be to investigate and further define, if possible, the role of the response class as an independent variable bearing on such a relationship.

The following are hypothesized for the present study:

- (1) That conditioning will occur for subjects run under both Taffel-type (14) and Greenspoon-type (4) models.
- (2) That conditioning will not be significantly greater for subjects run under the more highly structured model (Taffel) than under one considerably less structured (Greenspoon).
- (3) That awareness, as assessed by post-experimental interviews, will be significantly greater for those subjects under a Taffel-type than under a Greenspoon-type model.

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CHAPTER II

REVIEW OF THE LITERATURE

Historically, interest in verbal operant conditioning dates back to at least 1885 when Ebbinghaus published Memory: A Contribution to Experimental Psychology (9). Thorndike (26) then hypothesized that verbal praise and punishment could be effective in modifying verbal behavior. Thorndike, however, was primarily interested in showing that reward was superior to punishment in producing responses through the strengthening of connections rather than in the experimental control of verbal behavior in itself.

Verbal Operant Conditioning in the 1950's

It was not until the middle 1950's that verbal operant conditioning became the object of more serious experimental investigation. In 1955, Greenspoon (11) reported that previous studies of the effects of reinforcement presented immediately after the occurrence of a response had usually been those employing infra-humans as Ss. Greenspoon also states that there had been comparatively little effort made toward identification of those stimuli which would prove to be reinforcing to humans (11, p. 409). It was pointed out that only a very few reinforcing stimuli had been isolated.

The primary purpose of Greenspoon's investigation was to determine whether or not the introduction and omission of two spoken sounds would significantly affect the frequency of occurrence of a previously selected response class. The two sounds selected were "mmm-hmm" and "huh-uh." An additional purpose was to ascertain if these sounds did function as reinforcers (11, pp. 409-410).

Using seventy-five college students enrolled in undergraduate elementary psychology and speech classes as Ss, Greenspoon asked only that they "say words" (11, p. 410). Plural nouns and non-plural responses (which included all verbal responses excepting plural nouns) were reinforced with the two selected sounds. The results indicated that "mmm-hmm" increased the frequency of plural nouns, while the frequency was decreased by "huh-uh." The frequency of non-plural responses was increased by both stimuli (11, p. 416). Greenspoon concluded:

The contingent stimulus, "mmm-hmm", had the same effect on both responses. The stimulus, "huh-uh", had different effects on the two responses. This differential effect on the two responses suggested that the nature of the response is a determinant of the reinforcing character of the stimulus (11, p. 416).

Greenspoon also found that, in response to a four-question interview conducted after extinction trials, ten Ss were aware of the relationship between their responses and the reinforcement. Data of these Ss were thus eliminated from statistical analysis.

Another study was that conducted by Taffel (25), in which the relationship between anxiety and verbal conditioning was studied. Taffel was principally interested in how verbal conditioning could be used in a psychotherapeutic setting. Taffel stressed the importance of recognizing the verbal response as behavior in its own right, not the mere reflection of an inferred process (25, p. 496). Taffel stated that in the development of the "Taylor Manifest Anxiety Scale" (TMAS, 24), it had been found that anxious Ss exhibited consistently superior eyelid conditioning. As one of his experimental hypotheses, Taffel proposed that the amount of conditioning could be shown to be not only a function of the reinforcer, but also a function of the individual personality, of which anxiety might be a part. (25, p. 496).

Ninety psychotic and neurotic hospital patients were used as Ss in the Taffel (25) study. Ss were asked to construct sentences, beginning with one of six personal pronouns and using a verb, all of which were typed on index cards. There were eighty sentences (or trials) in all. Ss in one group received the reinforcement "good," spoken by the E after each sentence begun with I or we. Ss in a second group received the reinforcement of the flash of a lightbulb for sentences similarly constructed. Ss in a third group received no reinforcement.

In addition to placing Ss under three experimental treatments, Taffel also divided Ss according to scores received on the TMAS (24). From analysis of the data, Taffel concluded that operant conditioning methods can be successfully applied to verbal behavior. It was also found that "good" was an effective reinforcer, but that the lightbulb was not reinforcing as used. Scores received on the TMAS were found to be related to the amount of conditioning. Finally, none of the Ss was judged to be aware of either the purpose of the experiment or of the response-reinforcement contingency. A short post-experimental interview was used in the assessment of awareness (25, p. 500).

Mandler and Kaplan (18) also attempted to reinforce plural nouns. Instructions given to Ss were virtually identical to those given by Greenspoon (11). In Mandler and Kaplan's study, Ss were required to say 500 plural nouns; "mmm-hmm" was employed as a reinforcer. When data of all Ss were pooled, however, it was found that the chosen reinforcement had had little effect on the relative production of plural nouns. The investigators consequently interviewed the Ss and found that the stimulus "mmm-hmm" had been interpreted differently by different Ss. Ss interpreting the reinforcement as having positive value thought that they were proceeding in the right direction, that they were saying the right kinds of words. Ss who translated the meaning of the reinforcement as being of negative value, however, believed

themselves to be mistaken in the kinds of words they were saying. When Ss were further divided into two groups on the basis of the evaluation given to the reinforcement, it was found that Ss in the "positive" group showed conditioning effects, while Ss in the "negative" group actually decreased the number of plural nouns emitted. In a post-experimental interview designed to test for awareness, it was found that although most Ss stated secondary hypotheses concerning the relationship between their verbalizations and E's behavior, none was able to specifically state the essential contingency.

Cohen, Kalish, Thurston, and Cohen (2) used a Taffel-type (25) paradigm. "Good" was used as a reinforcer. Ss were patients drawn from a general medical population. The results of this study indicated that the group receiving reinforcement showed successive increments in the reinforced response, while the control group exhibited no change. Questioning of Ss revealed no awareness of the response-reinforcement contingency.

Hildum and Brown (13) reinforced attitudes toward a previously selected topic in an interview situation. A questionnaire of fifteen items was used, with four possible responses to each item ranging from "strongly agree" to "strongly disagree." Statements were worded so that agreement with some statements constituted an unfavorable attitude; E was consequently reinforcing an attitude rather than a specific response category. "Mmm-hmm" and "good" were used as

reinforcers. It was found that "good" acted as a reinforcement on positive attitude statements, while "mmm-hmm" did not. In their assessment of awareness, Hildum and Brown found that eight of their twenty Ss noticed that E said "good"; only one S, however, expressed the thought that "good" meant approval. Only one S noticed that E had said "mmm-hmm"; this S thought E's response might have expressed approval. None of the Ss thought that E's reaction had influenced his answers.

Buss, Gerjuoy, and Zusman (1), also using a model similar to that of Taffel (25), studied the effect of three types of reinforcement on verbal operant conditioning. The selected reinforcers were "good," cigarettes or candy, and poker chips redeemable for cigarettes or candy. A total of 156 Ss was used, including both college students and psychiatric patients. The results indicated that "good" and cigarettes or candy acted as effective reinforcers, but poker chips produced no significant increases in conditioning. It was concluded that the relationship between awareness and conditioning was complex, dependent on both the population used and on the nature of the questions used in assessment of awareness.

In his review of the literature, Krasner (15) reported on many of the variables relevant to an understanding of verbal operant conditioning. He found that, in the majority of studies reviewed, Ss knew that they were partic-

icipating in a psychological experiment of some type. It was also found that four main categories of responses were considered: saying words or numbers; completing sentences; "story-telling" or interviews; and participating in a test-like situation. "Mmm-hmm" was found to be the most widely used verbal reinforcement; "good" was also extensively used. Other reinforcers ranged from "that's right on the button" to a paraphrase of an S's response. Krasner found that the subject populations most frequently used were undergraduate psychology students or hospitalized schizophrenic patients. In most investigations, only one E was used. Of all the studies reviewed, either a control group or a prereinforcement set of trials was used as a control; some investigators used both. Length of experimental sessions varied widely. Greenspoon's (11) Ss spent a total of fifty minutes in the experimental setting, while other investigators required that Ss remain in the situation but ten minutes. Finally, in the vast majority of experiments conducted, only a very few investigators found evidence of aware Ss. "Over half of the studies reported that none of the Ss evidenced awareness. In all, roughly 5% of all patients in the 31 studies combined became 'aware' by the definition of each E" (15, p. 159).

From an overview of the preceding articles, it may be concluded that a rather wide variety of models has been employed, although perhaps a slight majority used either a Greenspoon (11) or a Taffel-type (25) paradigm. One outstanding

observation is that although models and procedures did vary, conditioning was obtained under many different circumstances. Almost none of the investigations, however, found positive evidence of subject awareness.

Verbal Operant Conditioning in the 1960's

During the 1960's effort has primarily been directed toward a refinement of experimental procedure. Early investigators were accused of having failed to thoroughly assess the parameter of subject awareness. With awareness thus becoming an issue of considerable importance, lengthy questionnaires were developed in order to better determine the presence of aware Ss. Some experimenters felt that questionnaires previously employed were too short and ambiguous in wording to provide an accurate estimation of the number of Ss judged to be aware, and of the role assumed by such Ss in conditioning studies.

In 1960, Matarazzo, Saslow, and Pareis (19) conducted a study basically following a Greenspoon (11) paradigm. For two groups of Ss, plural nouns were reinforced with "good"; for the remaining two groups, human responses were reinforced. Human responses were defined as "any word which clearly and unambiguously designated a person" (19, p. 191). Conditioning for plural nouns was not obtained. As all seven published studies reviewed by Krasner (15, p. 160) showed that plural nouns were readily and significantly conditioned, it was hypothesized that the use of the reinforcer "good" may

have been a contributing factor to the obtained lack of conditioning. Previous investigators had used as reinforcement "mmm-hmm," a light, a buzzer, and "huh-uh." Human responses, however, were easily conditioned.

These investigators (19) also considered a number of additional variables. Although there was an age range of eighteen to forty-seven years for their eighty Ss, age did not significantly affect conditioning. Furthermore, it was found that conditioners and non-conditioners did not significantly differ in respect to sex, anxiety level, or vocabulary usage, as measured by the Vocabulary Subtest of the "Wechsler Adult Intelligence Scale" (WAIS, 28). Total time spent in the experimental session or rate of responding did not affect conditioning.

In their assessment of awareness of awareness, Matarazzo, Saslow, and Pareis (19) did not use a post-experimental interview. Rather, Ss were asked what they believed the purpose of the experiment to be, and to state the rationalization behind their answers. Ss were not questioned as to whether or not they were aware of changes in their own verbal behavior. Results of statistical analyses showed that Ss conditioned for plural noun responses were not significantly aware ($p < .001$). The data suggested that conditioning obtained for human responses was associated with Ss' greater ability to verbalize the purpose of E's reinforcing behavior.

These investigators (19) also proposed that a difference in response classes in level of difficulty as concepts may also affect conditioning.

That is, considered purely from the terms of difficulty of concept formation, it is reasonable to predict that Ss could more easily abstract or perceive the similarity among five verbal responses like mother, neighbor, friend, architect, plumber than among books, apples, cars, shoes, flowers. If this be true, then Humans as a response class may be more easily conditioned than the more difficult concept Plurals (19, p. 205).

B. F. Skinner's discussion of his concept of the discriminative stimulus is also quoted: "Thus, one could discover that a given listener is interested in people, although it would be quite rare to discover that a given listener is interested in plurals" (19, p. 204).

Levin (17), realizing that a majority of previously conducted experiments had supported a conception of conditioning without awareness, proposed that such a phenomenon was the result of insensitive interviewing procedures. In collecting conditioning data, Levin used a sentence construction task very similar to that used by Taffel (25); "good" was given as reinforcement. The post-conditioning interview consisted of nineteen questions. Answers to interview questions were then divided into two parts. When awareness was assessed on the basis of Ss' responses to the first four questions, only three of sixty Ss were classified as being aware of contingencies. On the basis of the first four questions plus the final fifteen, sixteen more Ss were judged to be aware.

In analyzing conditioning data, Levin (17) first discarded the data of the three Ss judged to be aware in terms of the brief (four-question) interview. Remaining Ss were labelled the "Unaware-Brief Interview" ("Unaware-BI") group. When their data were compared with those of the control group, analysis of variance showed that the "Unaware-BI" group showed a significantly greater increase of I, we responses from its initial operant level than did the control group.

The "Unaware-BI" group was then divided into "Aware" and "Unaware" groups on the basis of their responses to the last fifteen questions. The sixteen Ss judged to be aware showed significantly greater conditioning than those judged to be unaware, who did not differ from the control group.

Levin (17) interpreted his results as being in accord with findings of Taffel (25) and Cohen, Kalish, Thurston, and Cohen (2) in that when a brief interview was used to assess awareness, there was evidence for conditioning without awareness. However, when an extended interview was used, "the evidence for conditioning without awareness was largely accounted for by Ss who had been aware but whose awareness was not revealed by the brief interview" (17, p. 74).

Finally, Levin (17) separated Ss judged to be unaware on the basis of the extended interview into those aware and unaware of the reinforcement in itself. When this comparison was made, Ss unaware of "good" were not significantly

different from those judged as aware. Levin interpreted this finding as possibly supporting a view of conditioning without awareness.

Like previous investigators (19), Kanfer and McBrearty (14) contended that verbal conditioning was not a simple case of operant conditioning. They also made reference to Skinner's (20) concept of the discriminative stimulus. They claimed that discrimination learning, or learning to identify and differentiate the critical stimulus dimensions, may be a crucial determinant of performance. Kanfer and McBrearty believed that a Taffel-type (25) paradigm afforded much stimulus control. They postulated that learning would be affected to a greater degree in a model of this nature than in free operant conditioning, where relatively little stimulus control is possible.

A Taffel-type paradigm was employed in this study (14). Instead of using I and we as the critical response class, however, either a mildly or intensely hostile word was paired with a neutral word. Ss were asked to construct sentences using one of these words and a verb also typed on an index card. The reinforcement "good" was given whenever a hostile word was used. It was hypothesized that Ss in the group being reinforced for using intensely hostile words would condition faster than Ss reinforced for using mildly hostile words, as the disparity between an intensely hostile word and a neutral word should be greater than that between

a word only mildly hostile and a neutral word. These hypotheses were partially supported.

The results (14) indicated that the intensely hostile group (group IH) contained a significantly higher number of Ss judged to be aware of the response-reinforcement than did the mildly hostile group (group MH). Aware Ss in both groups showed conditioning. However, unaware Ss in group MH also showed conditioning effects. Kanfer and McBrearty concluded that their experimental hypothesis, that an easier discrimination should result in better performance, was not supported. The stimulus similarity variable did not affect learning in the same way as it affected awareness reports. Statistical analysis of learning trends showed that aware and unaware Ss differed significantly. Unaware Ss in group MH conditioned significantly more than Ss in group IH, who showed no evidences of learning.

In 1962, Spielberger, Berger, and Howard (21) attempted to show that verbal conditioning was a function of awareness, need for social approval, and an S's motivation to be reinforced. Using sixty-one male college students as Ss, the investigators employed a Taffel-type (25) paradigm. Ss were reinforced with "good" for beginning sentences with I or we. Both awareness and motivation to receive reinforcement were measured by post-treatment interview; need for approval was assessed by the "Marlowe-Crowne Social Desirability Scale" (3).

The results (21) showed that Ss aware of the response-reinforcement contingency conditioned significantly more than unaware Ss, who showed no evidence of learning. Aware Ss who were judged to be motivated conditioned better than aware Ss judged to be unmotivated. Need for approval was found to be unrelated to either motivation or performance.

Spielberger, Levin, and Shepard (23), in another study, investigated the effects of attitudes toward the reinforcement and awareness of contingencies on verbal conditioning. Following a basic Taffel (25) model, forty-five female undergraduate psychology students were assigned to three groups. In order to create a range of awareness and motivational effects, instructions given to the three groups were designed to be either neutral, inhibitive, or facilitative to Ss' becoming aware. Awareness and motivation were both measured by an interview following conditioning.

The results of this investigation (23) indicated that aware Ss showed significant acquisition of the conditioned response class. The instructions given did not have the anticipated effects on awareness, for more aware Ss were found in the neutral than in either the facilitative or inhibitive groups. However, facilitative instructions indirectly led to greater increments in the performance of aware Ss in that aware Ss given such instructions were highly motivated to receive reinforcement. Such Ss showed the greatest degree of acquisition of the conditioned response. There was no

evidence that unaware Ss learned. The findings suggested that awareness is a necessary prerequisite of conditioning, and that the extent to which Ss acted on awareness was determined by their attitudes toward reinforcement.

Dulany (7) felt that verbal operant conditioning could perhaps be mediated by Ss forming hypotheses and self-instructional sets concerning the response-reinforcement contingency. Two experiments were conducted. In the first experiment, Ss were instructed to say words, and plural nouns were reinforced with "mmm-hmm." When compared with the control group, Ss in the experimental group showed significantly greater conditioning. Approximately 25 per cent of Ss in the experimental group hypothesized that whenever E said "mmm-hmm," they were supposed to associate in series. When E said nothing, the hypothesis was made that they were to change semantic categories.

In the second experiment, Dulany (7) presented a word association test to Ss; verbal reinforcement was excluded. It was found that the frequency of plural nouns in response to plural nouns was significantly associated with a set to associate in series as opposed to a set to change categories. Dulany found no evidence for learning without awareness with a report of the correct or correlated response class as a criterion of awareness.

Spielberger and DeNike (22) attempted to replicate Greenspoon's (11) findings under conditions in which control

and reinforced Ss were carefully matched for initial operant rate of plural nouns. These investigators criticized the Greenspoon study in so far as Greenspoon's conditioning data indicated that the mean number of plural nouns emitted by both his reinforced and control groups actually declined over time. This finding led Spielberger and DeNike to believe that Greenspoon's reinforcer had little effect after the initial (operant) time period, thus raising the question of whether or not the groups were initially well-matched for operant rate.

Using thirty-two male undergraduate psychology students as Ss, the experiment (22) closely followed the original Greenspoon study (11). The results indicated that all Ss noticed the reinforcement, but none was able to verbalize the correct contingency. After post-experimental questioning was conducted, data of Ss judged to have formulated partially correct hypotheses concerning their behavior were eliminated from analysis. No significant differences were found between unaware Ss who received reinforcement and unreinforced controls.

In this study (22), it was contended that a significant time periods by groups interaction would have supported Greenspoon's hypothesis that reinforcement provided the difference between his experimental and control groups. Greenspoon, however, reported only a significant main effect of groups in his generalized analysis of variance. "This effect

could be attributed as readily to uncontrolled differences between groups in operant rate which persisted over time, as to the effects of reinforcement" (22, p. 363).

Ekman, Krasner, and Ullmann (10) attempted to manipulate set and awareness by altering instructions given to Ss in an experimental psychotherapeutic setting. These investigators considered manipulation of awareness to be superior to assessment by post-experimental interview. In an effort to study emitted rather than elicited verbal behavior, Ss were asked to associate to cards similar to those used in the "Thematic Apperception Test" (TAT, 24). Some Ss were given reinforcement for responses pertaining to "personal problems" while others were reinforced for making "empathic" responses. It was found that set and awareness could not be independently considered. The investigators also state that "... induced awareness will differentially affect conditioning depending on an S's orientation" (10, p. 388). Verbalization of the response-reinforcement contingency was not found to be a reliable predictor of whether or not conditioning would be facilitated. It was also found that if an S associated unpleasantness with the response given reinforcement, increased awareness led to suppression or inhibition of this response. Conversely, some indication in support of behavior modification was found if Ss' induced "sets" were positive; such "sets" led Ss to regard E's reinforcing behavior as an indication of favor.

Krasner and Ullmann (16), in a review of studies pertaining to verbal conditioning, concluded that: (1) the level of awareness reported by Ss is influenced by informational cues; (2) the verbal behavior of reporting awareness may itself be conditioned; (3) Ss' personalities and the atmosphere of the experiment are both relevant variables in the reporting of awareness; and (4) the same variables which produce and influence conditionability influence the level of reported awareness, and as such, a positive correlation between the two does not necessarily imply that awareness mediates conditionability (16, pp. 194-196). Krasner and Ullmann believe that post-conditioning interviews may be prone to retrospective distortion, or of inducing a set to be aware. It is further stated that verbal conditioning is a very complex process, a function of many variables and interactions among variables.

DeNike (4), using a Greenspoon-type (11) model, departed from the usual method of assessing awareness. His Ss were instructed to record their "thoughts about the experiment" during the experimental session proper, in an effort to avoid Ss' astute ex post facto judgments felt to be a confounding variable. Human noun responses were reinforced. The results indicated that conditioning gains occurred only for Ss judged to be aware on the basis of identification of the response-reinforcement contingency, noted in their "thoughts about the experiment." DeNike tentatively

concluded that there could be some evidence for conditioning without awareness in so far as verbalization of contingencies could be considered at the same time a result of past improvement and a condition of any further improvement. It might be speculated that Ss judged to be aware showed initial performance gains without awareness, becoming aware of the crucial contingency as a result of their previous performance.

Weinstein and Lawson (30) experimentally induced awareness in their study. The conditioning of plural nouns in a standard Greenspoon (11) model was investigated as a function of the amount of information explicitly given Ss concerning the nature of the experiment. Some Ss were told the correct response halfway through the session; performance of these Ss was far superior to all other Ss. However, Ss told only that there was some type of correct response also showed conditioning. Ss given reinforcement without information did not differ significantly from unreinforced controls. Using four methods for measuring awareness, it was found that awareness was some function of the amount of information given.

Dixon and Oakes (5) felt that awareness was a function of the "simple and obvious" contingency such as that found in the Taffel (25) study. Following a Taffel-type paradigm, these investigators tested certain hypotheses formulated by Dulany (8) which theorized that conditioning was affected by Reinforcement Hypotheses (RH), Behavioral Hypotheses (BH),

and Behavioral Intentions (BI) on the part of Ss. Dulany (8) had created these hypotheses to explain his view of awareness as a self-instructional set mediating the response in verbal conditioning.

Using 100 psychology students as Ss, Dixon and Oakes (5) "interfered" with Ss' opportunity to formulate hypotheses during conditioning by means of an intertrial color-naming task. It was supposed that such interference might adversely affect reported awareness but not conditioning. The results showed that color-naming did not adversely affect conditioning in the experimental group receiving reinforcement (as would be expected from the Dulany position). Both the group reinforced for color-naming and a reinforced control group which did not perform the color-naming task showed evidences of learning. The reinforced groups did not differ significantly in respect to degree of conditioning. It was also found that the degree of relationship between RH ratings and conditioning differed significantly for the two reinforced groups. These findings suggested that the nature of the experimental task, together with an interview after conditioning, resulted in a certain distribution of degree of awareness among Ss in a reinforced group. It was also argued that the degree and direction of the relationship between level of awareness of individual Ss and their degrees of conditioning were dependent on the degree to which hypotheses were made during acquisition.

Hersen (12), also using an intertrial task, assessed the effects of repeated inquiry during training in a group paradigm of verbal conditioning. The results showed that Ss able to verbalize the response-reinforcement contingency conditioned better than those unable to do so. However, since only a small percentage of Ss were found to be aware, Hersen concluded that the inquiry technique used may have had a confounding effect on the Ss.

Several investigators have used children as Ss in awareness-conditioning studies. Although Vogler (27) conditioned a response that could be defined as a cooperative, physical task rather than a verbal response, awareness was also successfully assessed. Ss in the Vogler study were children between the ages of six and eight years. Positive performance gains were obtained only from Ss verbalizing a correct contingency. Doctor (6) also used children as Ss. A Taffel (25) paradigm was used, and conditioning was carried out under one of three combinations of reinforcement. For one group, E said "right" for correct and "wrong" for incorrect responses. In a second group, "right" was said for correct responses, while nothing was said when a response was wrong. A third group received no response from E for correct answers and "wrong" for incorrect ones.

Contrary to previous findings, differential performance effects were not obtained by Doctor (6). This result was interpreted as being partially due to the use of a sentence

construction task instead of a concept formation one. Conditioning was also found to be unrelated to sex of S, grade level, or type of school attended. Aware Ss accounted for the majority of variance in conditioning.

Doctor's (6) three groups did not differ in either overall performance or performance over trials. A highly significant F for between-group trends indicated that performance curves of aware and unaware groups departed significantly over trials. Only Ss judged to be aware were conditioned.

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CHAPTER III

METHOD

Subjects

The Ss were thirty-four male and female patients from the Children's Psychiatric Hospital of the Austin State Hospital in Austin, Texas. Ss ranged in age from eleven to fifteen years. Patients with intelligence quotients below eighty (Full Scale Scores, as measured by the Wechsler Intelligence Scale for Children, WISC, 5) were excluded from the present research. Ss were not excluded merely on the basis of admitting diagnoses, so that some Ss diagnosed as exhibiting mild organic brain damage were included in the study.

Apparatus

The stimulus materials for the conditioning task were 100 three-inch by five-inch unruled white index cards. On each card, a different past tense verb, selected from a list of 1, 000 words most frequently used in written English (4), was typed in upper case letters. Above the verb, the pronouns I, we, you, he, she, and they were also typed in upper case letters. The order of appearance of pronouns was randomized over all cards; no two cards had the same order of pronouns. The cards were then placed in random order.

Procedure

The experiment was conducted in three sessions on consecutive days. A two by two factorial design was used. Prior to the first session, Ss were assigned to one of four conditions on a random basis. Experimental Ss were conditioned under either a reinforced Taffel-type (3) or Greenspoon-type (2) paradigm. Control Ss served under both types of paradigms, but received no reinforcement. Nine Ss served under each condition, with the exception of the Taffel-type control group, which contained but seven Ss due to hospital discharges. One E, a male psychology student at the University of Texas at Austin, collected conditioning data. All Ss were seen individually.

For Ss serving under a Taffel-type (3) model, the following instructions were given:

We are doing a study on how people use words. What you are to do is very simple. When I hand you a card, you will see a group of words in the center of it. You are to make up a sentence beginning with one of these words and using the word below the group somewhere in your sentence. It doesn't matter whether the sentence you make up is long or short, complicated or simple. It is important that you answer with the first sentence that enters your mind. I know this isn't always easy to do, but if you answer quickly, you will find that you will be more likely to say the first thing you think of. Do you have any questions? (Answer questions by repeating the appropriate part of the instructions). All right, let's begin.

The index cards were then handed to S one by one. The cards were kept in the same random order for all Ss. For the first twenty sentences (trials), E said nothing after S's

responses. For the experimental Ss, E said "good" in an unemotional tone during trials 21-100 for any sentence begun with I or we. For the control Ss, there was no change in procedure from trials one through twenty.

Ss were given the following instructions under a Greenspoon-type (2) model:

We are doing a study on how people use words. What you are to do is very simple: say words. Any words you think of will be fine--for example, TREE, BIRDS, PEOPLE, BUILDING, FRIEND--but you must say them one at a time. They must be words--no numbers or sentences, please. We will be making a recording of what you say, so I won't have to write it down by hand. I will also be making note of the time. This is not a test for speed, however, so please do not hurry. Take the time you need so that what you have said will be clear to us later. Do you have any questions? (Answer all questions by repeating the appropriate part of the instructions). All right, you may begin saying words.

For the first three minutes, E made no response to Ss' verbalizations. For the experimental Ss, E then said "good" in an unemotional tone during the remaining twelve minutes of the task for all plural nouns emitted by Ss. For the control Ss, there was no change in procedure from the first three minutes.

Responses of Ss serving under a Taffel-type (3) paradigm were recorded by E on a data sheet on which the numbers 1-100 were followed by the pronouns used in the conditioning task. The single pronoun used by Ss on each trial was recorded (circled) by E. Responses of Ss serving under a Greenspoon-type (2) paradigm were recorded by E on a standard Cassette recorder. Each S was allowed fifteen minutes of taping.

Immediately following conditioning, all Ss were interviewed by a second E, a female psychology student who had no knowledge of conditioning results. The purpose of the interview was to discover if Ss were aware of the contingency between their responses and E's reinforcing behavior. In order to approximate assessment of awareness conducted in previous research, interview questions were quite similar to those used by Taffel (3), Greenspoon (2), and Levin (1). Questions were worded so as to avoid suggesting the correct contingency to Ss. Ss' responses were recorded verbatim by E. The interview schedule for Ss serving under a Taffel-type (3) model may be found in the appendix. For Ss receiving a Greenspoon-type (2) treatment, the interview schedule was essentially identical in content. "Saying words" was substituted for "going through the cards" as required.

For all Ss, both conditioning and interviewing were conducted in a small office containing a desk and two chairs. E and S sat across from one another at the desk. S was not able to see E's recording activity, although the tape recorder used was in sight on the desk.

Instead of asking children not to discuss the experiment with their friends, Ss under different experimental treatments were alternately seen by E. By handling the problem in this manner, the tendency of Ss to influence each other's responses should have been minimized.

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CHAPTER IV

RESULTS

Analysis of Conditioning Data

For purposes of statistical analysis, conditioning data of Ss serving under a Taffel-type (2) model were divided into five blocks of twenty trials each. Data of Ss serving under a Greenspoon-type (1) model were divided into five blocks of three minutes each. For all Ss, the first block served to establish operant rates for I, we responses or plural noun responses. Blocks two through five were reinforced for experimental Ss. Control Ss received no reinforcement.

To test for conditioning, t-tests for correlated groups (3, p. 169) were then conducted between blocks one and blocks two through five for data collected from the four conditions. For all Ss, the per cent of change in mean rates of emission of I, we or plural noun responses between block one and blocks two through five were calculated. Resultant data were subjected to a two by two analysis of variance (4, pp. 241-243).

At the .05 level of probability, reinforced Ss serving under a Greenspoon-type (1) model conditioned significantly (t = 2.69). Reinforced Ss serving under a Taffel (2) model,

however, did not differ significantly from unreinforced controls ($t = 1.42$). The results of t -tests are summarized in Table I.

TABLE I

SUMMARY OF t -TESTS OF DIFFERENCES BETWEEN BLOCKS ONE AND BLOCKS TWO THROUGH FIVE OF CONDITIONING DATA OF REINFORCED AND NONREINFORCED SUBJECTS UNDER DIFFERING PARADIGMS

Paradigm	<u>Ss</u>	N	<u>t</u>	\bar{X}_1^{**}	\bar{X}_2^{***}
Taffel	Reinforced	9	1.42	3.20	4.40
	Nonreinforced	7	1.68	2.40	3.13
Greenspoon	Reinforced	9	2.69*	24.64	40.99
	Nonreinforced	9	.39	27.97	28.99

* $p < .05$

** \bar{X}_1 = Mean numbers of I, we responses or plural nouns emitted in block one.

*** \bar{X}_2 = Mean numbers of I, we responses or plural nouns emitted in blocks two through five.

The results of the analysis of variance were not

TABLE II

SUMMARY OF THE ANALYSIS OF VARIANCE OF THE DIFFERENCES IN PER CENTS BETWEEN MEANS OF BLOCKS ONE AND BLOCKS TWO THROUGH FIVE FOR CONDITIONING DATA

Source	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>
Method (A)	.0042	1	.0042	.0035
Reinforcement (B)	2.0912	1	2.0912	1.7911
A X B	1.1115	1	1.1115	.9520
Within cell	35.0252	30	1.1675	

significant at the .05 level of probability. The results indicated that mean per cents of change in response rate were not significantly affected by type of model, by reinforcement, or by an interaction between groups and trials. The results of the analysis of variance can be seen in Table II.

Analysis of Awareness

In the present research, Ss were considered to be aware if it was stated that reinforcement ("good") had followed sentences begun with I, sentences begun with we, sentences begun with I and we, or plural nouns. If acted upon, these contingencies would have brought reinforcement 100 per cent of the time. It was also required that, in answer to Question A of the post-conditioning interview, Ss state that awareness of contingencies occurred during conditioning proper.

Two judges, who had no knowledge of conditioning results, rated Ss as either aware or unaware of the contingency on the basis of answers to the post-experimental interview. Interjudge agreement in classification of Ss was perfect. It was found that only two Ss in the entire experiment were judged to be aware. Both of these Ss had served under the reinforced Taffel-type (2) model.

A t-test for proportions between aware Ss under the reinforced Taffel-type (2) model and Ss under the reinforced

Greenspoon-type (1) model resulted in an obtained value of 1.59. This value of t was not found to be significant at the .05 level of probability. The results of the t -test were interpreted as indicating that a more highly structured conditioning task did not significantly affect awareness of the response-reinforcement contingency.

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CHAPTER V

DISCUSSION

In the present study, significant conditioning was obtained for Ss serving under a Greenspoon-type (7) model. Ss serving under a Taffel-type (11) model, however, did not show evidence of conditioning. Nonsignificant results obtained under the sentence construction model are not consistent with results obtained in previous studies using similar procedures (1, 2, 8, 10).

Previous research has indicated that motivation may be an important factor affecting conditioning (9). Attitude toward reinforcement and mental sets are two additional variables which may also affect performance (5, 10). Statistical analyses were not conducted on interview questions designed to assess motivational factors. However, all but three of the total number of eighteen Ss receiving reinforcement indicated that they cared very little whether or not E said "good." Such attitudes may have produced a significant decrement in conditioning. However, it is surprising that lack of motivation as defined by responses to interview questions did not lower conditioning in both experimental groups. It also seems highly unlikely that a majority of Ss viewing reinforcement negatively would be found in one group.

The nature of the subject population used may have led to experimental confounding. Previous investigations of verbal operant conditioning have usually used college students enrolled in psychology courses (1, 3, 7, 9) or adult, hospitalized psychiatric patients (1, 2, 11) as Ss. While children have been used as Ss in two studies reviewed in the literature (4, 12), there seems to be no previous investigation conducted in which hospitalized children served as Ss under the present or similar conditions. In some studies (6, 11), all patients with any evidence of organic brain damage were excluded from participation. In the present research, patients with mild organic involvement were not disqualified from serving in the experiment. It is possible, since Ss were not matched for the variable of organicity, that conditioning results were differentially affected to a significant degree.

Tentative support may be provided for a conception of conditioning without awareness. Results of analysis of variance of differences in per cents in mean rates of conditioned responses revealed that the relative structuredness of the model used did not significantly affect conditioning. Use of reinforcement and possible interaction between reinforcement and paradigm were also found to be nonsignificant. Although Ss serving under the Taffel-type (11) model were not found to be significantly more aware of the response-reinforcement contingency than Ss serving under the less structured

Greenspoon-type (7) model, Ss serving under the Greenspoon model showed significant evidences of conditioning. And no Ss under the Greenspoon treatment were classified as aware.

Any conclusions as to the implications of the obtained results should be considered carefully. Experimental contamination, most probably emanating from the nature of the subject population used, may have affected all obtained results. It may be argued that conditioning and awareness were both adversely affected by use of a task too difficult for Ss used. Although Vogler (12) found positive evidences for both conditioning and awareness using children as Ss, both the nature of his experimental task and the conditioned response itself were much like a "game." Children were not required to participate in a relatively sophisticated experimental procedure. Although Doctor (4) successfully conditioned his grade-school aged Ss in a Taffel-type (11) paradigm, the Ss were not hospitalized psychiatric patients. Some degree of interaction between mental status of Ss and sophistication of task may have led to lack of significant results obtained for Ss under the Taffel-type model. Such interaction may also have negatively influenced reported awareness.

The results of the present experiment provide considerable implications for further research in the area using children as Ss. An experimental replication, using as Ss children of the same age range who were not hospital

patients, might provide some information as to whether or not the present results were contaminated by the variable of mental illness. Such a replication might also give information as to the relative effects of subject motivation and task difficulty on awareness and conditioning.

As only one of the experimental hypotheses was decisively supported (Number Two), it is felt that conclusions and deductions based on the obtained results should be accordingly tentative. It is felt that little real support has been provided for either a cognitive or a behavioristic theoretical frame of reference. The results of the present research are too inconclusive to be interpreted as upholding either position, although limited evidence for conditioning without awareness was found.

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CHAPTER VI

SUMMARY AND CONCLUSIONS

The primary purpose of the present study was to evaluate the effects of reinforcement and type of experimental model upon conditioning in hospitalized children. It was hypothesized that a more highly-structured model would facilitate Ss' awareness of the response-reinforcement contingency. Thirty-four patients were randomly assigned to two experimental and to two control groups in a two by two analysis of variance. For Ss assigned to one experimental condition, sentences beginning with I and we were reinforced by E's saying "good." Ss assigned to the second experimental condition were required to say words; plural nouns were reinforced by "good." Ss under control conditions performed each task in the absence of verbal reinforcement.

A post-experimental interview, consisting of eighteen questions designed to investigate Ss' awareness of the contingency between their responses and E's verbal reinforcement, was administered to all Ss. Questions used were adapted from similar interviews used in previous investigations (1, 2, 3). Questions were designed so as to not suggest correct contingencies to Ss while obtaining as much information as possible.

The results indicated that Ss serving under a Green-spoon-type (1) model showed evidence of conditioning, while those under a Taffel-type (3) model did not. Analysis of variance showed that structuredness of model, reinforcement, or an interaction between the two did not produce a significantly greater number of Ss who conditioned under a reinforced, highly structured model as opposed to those reinforced under a less structured model. Only two Ss in the entire experiment were judged to be aware. Although both of these Ss were found in the more highly structured group, there was no evidence that Ss under the more highly structured model were significantly more aware than control Ss.

The results were then discussed in respect to the nature of certain subject and task variables. It was stated that the fact that Ss used were hospitalized psychiatric patients may have had a confounding effect on the results. Age of Ss, the general lack of subject motivation, and level of task difficulty were also cited as possibly adversely affecting both conditioning and awareness.

Although limited evidence for conditioning without awareness was found, it was stated that conclusive support for either a cognitive or behavioristic explanation of the phenomenon under study could not be given. Experimental confounding, possibly originating from uncontrolled subject variables, may have affected all results. Suggestions for further research were then made.

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APPENDIX

Post-experimental Interview Schedule

1. Did you usually say the first sentence you thought of?
2. How did you decide which of the words to use?
3. Do you think you used some of the words more often than others? Which words? Why?
4. What do you think this was all about?
5. What did you think about while you were making up your sentences?
6. While you were going through the cards, did you think you were supposed to make up your sentences in a certain way?
7. Did you start feeling like you were supposed to change the way in which you made up sentences? How?
(If S says that E said "good" in answer to any of the previous questions, Questions 8--10 will not be asked as they are designed to investigate awareness of the reinforcement.)
8. Did you notice anything else that was happening while you were going through the cards?
9. Did you notice anything about me?
10. Did you notice that I said anything?
(If S failed to mention "good" in answering Question 10, the interview will be ended as all remaining questions refer to S's reaction to "good." Interview is ended here for controls.)
11. What did my saying "good" mean to you?
12. Did you try to figure out what made me say "good" or why or when I was saying "good"? (If S says "no," follow with Question 15.)
13. How hard would you say that you tried to figure out what was making me say "good"? Very hard, fairly hard, not hard at all.
14. What ideas did you have about what was making me say "good"?
15. Would you say that you wanted me to say "good" very much, some, or did you really care?
(Proceed with the following if a correct contingency given.)
 - (A) Were you actually aware of that while going through the cards, or did you just think of it?
 - (B) Do you remember when that idea occurred to you?
 - (C) Did the fact that you realized this have any effect on how you made up your sentences?(All Ss verbalizing a correct contingency will also be asked Question 15.)

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