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The Effect of Verbal and Nonverbal Reinforcing Stimuli on the Conditioning of Word Choices

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THE EFFECT OF VERBAL AND NONVERBAL REINFORCING STIMULI ON THE CONDITIONING OF WORD CHOICES

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CHAPTER I

THE PROBLEM AND REVIEW OF THE LITERATURE

Measurable change in verbal behavior as the result of the introduction of experimental variables has been an area of investigation receiving attention since the earliest theories of learning were proposed in America. With the development of operant conditioning techniques and their subsequent application to verbal behavior, numerous investigations were undertaken to determine the effectiveness of various stimuli as reinforcers. Such investigations have stressed verbal reinforcing stimuli more than that of nonverbal, gestural, reinforcing stimuli.

I. THE PROBLEM

The purpose of the present study is to determine the relative effectiveness of specific verbal and nonverbal reinforcing stimuli in an operant verbal conditioning technique.

Instrumental or operant conditioning concerns itself with the effect of the consequences of behavior upon the probability of a reoccurrence of that behavior. The term "operant" "emphasizes the fact that the behavior operates upon the environment to generate consequences" (24:65).

If the effect of the consequences is such that the frequency of the response is increased, reinforcement has occurred.

Operant behavior as described by Skinner (24) is emitted instead of elicited. The emitted behavior is related to an existing stimulus, but the stimulus may be unknown or unidentified. Reinforcement is presented when desired or appropriate behavior is emitted. Therefore, the reinforcement is correlated with the response (9:84) and is under the control of the organism (9:52).

Operant conditioning, therefore, may be described as a process or method by which the frequency of a desired or designated response may be increased by a contiguous reinforcing stimulus. Thorndike and Skinner were early exponents of instrumental or operant conditioning (9:82).

The present study was undertaken to determine if a specific nonverbal reinforcing stimulus was more effective than a specific verbal reinforcing stimulus in bringing about a change in behavior in a verbal conditioning experiment.

A nonverbal reinforcing stimulus for the purpose of this study was defined as an observable behavioral manifestation that exists in social interaction, specifically a combination of a smile and an affirmative nod of the head.

A verbal reinforcing stimulus for the purpose of this study was defined as an audible behavioral manifestation, specifically "Good" delivered in a neutral tone.

A change in behavior for the purpose of this study was measured by the change in frequency of verbal response, specifically the change in frequency of response of a preselected category of words. A multiple-choice word preference situation was developed composed of a stimulus word and four words representing each of four type-of-response categories. On the basis of two pilot studies, a category was selected for reinforcement.

II. REVIEW OF THE LITERATURE

Experiments in the area of verbal behavior were reported as early as 1932 when Thorndike (9:27) was accumulating data about the Law of Effect. A multiple-choice vocabulary test was designed whereby the subjects were to select from five English words the correct translation for the stimulus Spanish word. Correct choices elicited "Right"; incorrect choices elicited "Wrong." The list was administered again to determine the effect of the reinforcing stimuli.

Experimentation with a variety of reinforcing stimuli in verbal conditioning gained impetus with the studies of

Greenspoon. In a study published in 1954, Greenspoon (5) reported the effects of two nonverbal stimuli on the frequency of plural and nonplural responses. Using a 5-w. red light and a 190-cps tone as reinforcing stimuli, five groups of human subjects were instructed to say words. One group received the light as a reinforcing stimulus for plural noun responses; a second group received the light for each response that was not a plural noun. Two groups were similarly reinforced by the tone. The results showed a significant difference in mean number of responses, plural noun or nonplural, for all four of the experimental groups when compared with the control group.

In 1955 Greenspoon (6) reported the results of a study whose primary purpose was to investigate the effect of the introduction of spoken sounds on a predetermined response. Five groups of fifteen subjects each were established. Each subject was asked to say words for fifty minutes. Reinforcement was given for the first twenty-five minutes in the form of "mmm-hmm" or "huh-uh" e.g., one group was reinforced with "mmm-hmm" for all plural noun responses, the second group by "huh-uh" for all plural noun responses, a third group by "mmm-hmm" for all nonplural responses, and the fourth group by "huh-uh" for all non-plural responses. The fifth group served as the control.

Greenspoon reported that "mmm-hmm" significantly increased the frequency of plural responses and tended to increase the frequency of nonplural responses; "huh-uh" significantly decreased the frequency of plural responses, but tended to increase the frequency of nonplural responses. The differential effect of "huh-uh" on the two responses was explained in part by the author: (1) the result of the elimination of "aware" subjects in the second group so that the data were computed for only six subjects in this group, and (2) plural nouns form a small and narrowly defined class as compared to the nonplural responses. ". . . Thus, either the relative size or the heterogeneity of the class, or both, may be factors in determining whether or not a particular stimulus will be a reinforcing stimulus" (6:415).

Krasner (13) reported a review of thirty-one studies of the conditioning of verbal behavior, all of which followed the Skinnerian paradigm where the verbal behavior is the dependent variable and the generalized conditioned reinforcers are the independent variables.

Table I is a reproduction of that of Krasner's in which the results of these studies are summarized.

Krasner (13) categorized these studies into four experimental situations. Saying words or numbers is a situation which consists of instructions to the subjects to say

TABLE I

SUMMARY OF RESULTS OF "VERBAL CONDITIONING" STUDIES

Author	Reinforcing Stimuli	Class of Behavior Reinforced
	Positive Results[a]	
Ball	"mmm-hmm"	"animal"
Greenspoon	"mmm-hmm"	plural nouns
Mandler & Kaplan	"mmm-hmm"	plural nouns
B. Sarason	"mmm-hmm"	verbs
I. Sarason	"mmm-hmm"	"verbal activity" verbs
Mock	"mmm-hmm," head nod	"mother"
Krasner	"mmm-hmm," head nod, smile	"mother"
Salzinger & Pisoni	"mmm-hmm," "uh-ha," or "I see"	affect statements
Wilson & Verplanck	"mmm-hmm," "good," or writing	plural nouns, adverbs or travel verbs
Binder et al.	"good"	"hostile" verbs
Cohen et al.	"good"	"I," "we" pronouns
Cushing	"good"	"like" person in pictures
Grossberg	"good"	"I," "we" pronouns
Ekman	"good"	anti-capital punishment response
Hartman	"good"	"I," "we" pronouns
Hildum & Brown	"good"	"attitudes"
Klein	"good"	"I," "we" pronouns
Nuthmann	"good"	"acceptance of self"
Taffel	"good"	"I," "we" pronouns
Tatz	"good"	a pair of digits
Fahmy	"good-one"	human responses
Spivak & Papajohn	"right"	autokinetic effect
Wickes	"fine," "good" or "all right"	movement responses
Wickes	head nod, smile, or lean forward	movement responses
Ekman	head nod, smile, and lean forward	movement responses
Greenspoon	light	plural nouns
Sidowski	light	plural nouns
Greenspoon	buzzer	plural nouns
McNair	bell tone	rate of verbalization

TABLE I (continued)

Author	Reinforcing Stimuli	Class of Behavior Reinforced
Verplanck	paraphrase, agreement, smile	opinions
Kanfer	"that's accurate," etc.	autokinetic effect
Hartman	head shake[b]	"I," "we" pronouns
Mock	head shake, "huh-uh"[b]	"mother"
Greenspoon	"huh-uh"[b]	plural nouns
	Negative Results[c]	
Daily	"mmm-hmm"	"I," "we" pronouns
Hildum and Brown	"mmm-hmm"	"attitudes"
Cushing	"good"	"dislike" persons in pictures
Daily	"good"	"I," "we" pronouns
Marion	"good"	"I," "we" pronouns
Hartman	head nod	"I," "we" pronouns
Fahmy	repetition of response	human responses
Fahmy	"give another one, please"	human responses
Ball	light	"animal"
Nuthmann	light	"acceptance of self"
Taffel	light	"I," "we" pronouns
Ball	buzzer	"animal"

[a] The reinforced behavior changed significantly in the hypothesized direction during reinforcement sessions.

[b] Resulted in decrease; all others resulted in increase of reinforced behavior.

[c] The reinforced behavior either did not increase significantly or its increase was no more than in a control group.

all the words they can think of omitting numbers, sentences, and phrases with reinforcement given to a preselected category as plural nouns (*5, *6, *16, *33)[1].

Completing sentences, a technique first reported by Taffel and that utilized by the largest number of the studies, is a situation which consists of the presentation of cards on which are printed a verb and a series of pronouns with instructions to make-up a sentence with reinforcement given to a preselected pronoun or pronouns (*3, 22)[1]. Variations of this situation are reported wherein a specific verb or class of verbs was reinforced rather than the pronouns.

"Story-telling" or interviews is a situation which consists of the subject being asked to make-up a story to include certain designated categories or characters. Reinforcement is given to a preselected category or character or, in the case of the interviews, certain predetermined affect responses, opinions, or rate of verbalization (*14, *29, *18)[1].

Test-like situations consist of inkblots, attitudes, questionnaires, and "acceptance-of-self" statements among others with reinforcement given for a predetermined category of response (*8, *19, *32, 15, 7)[1].

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[1]Studies included in Krasner's review are indicated by the asterisk.

Krasner (13) also categorized the reinforcing stimuli into three general types: verbal, "mmm-hmm" the most widely used with "Good" also frequently used; gestural, head nods and smiling used in combination with or as alternatives with the verbal cues; and mechanical, light or buzzer or bell tone.

Studies (3, 6, 7, 8, 15, 16, 19, 20, 22, 32, 33) show that conditioning, a measurable change in rate of response, of verbal behavior is possible by the use of verbal reinforcing stimuli. Studies (14, 29) show that conditioning of verbal behavior is also possible by the use of a combination of verbal and nonverbal (gestural) reinforcing stimuli. Furthermore, studies (5, 7, 15, 18, 32, 33) show that conditioning of verbal behavior is possible by the use of nonverbal (mechanical or gestural) reinforcing stimuli.

Krasner (14) and Verplanck (29) reported successful conditioning with a combination of verbal and nonverbal (gestural) reinforcing stimuli and speculation rises as to the particular contribution of each cue to the effectiveness of the reinforcement combination.

Wilson and Verplanck (33) found both verbal and nonverbal (writing down the word) reinforcing stimuli effective in a say words situation with an increased rate of plural nouns for seven out of seven subjects with the verbal reinforcement and an increased rate of plural nouns for six out

of seven subjects with the nonverbal reinforcement. Magnussen (15) found both verbal and nonverbal (head nod) reinforcing stimuli effective in increasing the number of popular responses in a Rorschach situation with no significant difference between them. Gross (7) reported the effectiveness of both verbal and nonverbal (head nod) reinforcing stimuli with no significant difference between them in a structured Rorschach situation with psychiatric patients in which general human content responses were reinforced. Wickes (32) reported that nonverbal actions (nodding three times, smile, leaning forward used separately and then repeated in that order) increased the mean number of movement responses in a thirty-card inkblot "test," when the reinforcement was applied to the last fifteen cards, significantly beyond the .005 level and verbal comments ("Fine," "Good," and "All right") increased the mean number of movement responses significantly beyond the .025 level of confidence. Comparisons were made between the first and last blocks of fifteen cards within each group. No comparison of the difference between the effectiveness of verbal and nonverbal reinforcement was reported.

Is it possible that preconditioning or pretraining or behavioral sets may be different for words than for gestures in that, while both are perceived in the context of past

experience, words may be subject to a greater diversity of interpretation whereas gestures are more specific in interpretation? Exploration of these possibilities will be discussed later.

Krasner provided an extensive list of questions for further research and included, "Under what conditions are nonverbal cues such as smile, head nod, body movements more effective than the usual verbal cues?" (13:165).

Magnussen (15) and Gross (7) found no significant difference between the effectiveness of verbal reinforcement and nonverbal reinforcement utilizing the Rorschach. Wickes (32) found both verbal and nonverbal reinforcement significant beyond the .025 level of confidence utilizing a thirty-card inkblot "test." Ekman, as reported by Krasner (13), found no difference in the effectiveness of nonverbal (combination of a head nod, smile, and slight movement forward) and verbal ("Good") reinforcement in the conditioning of responses to a questionnaire. The experimental situations of these four studies all fall into one (test-like) of the four categories as outlined by Krasner (13). What are the possibilities of the effectiveness of nonverbal reinforcing stimuli in a more structured test-like situation?

The study by Wilson and Verplanck (33) utilized a gestural reinforcing stimulus which did not require personal

interaction between subject and experimenter. The subject was an observer of the gesture without direct involvement with or inclusion in the gesture. The failure of this particular nonverbal reinforcing stimulus to be more effective than the verbal reinforcing stimulus is not discouraging to this study. Instead, the results are inappropriate to this study because the gestural reinforcing stimulus utilized was a different type in that it was not specifically addressed to the subject.

Magnussen's study (15) did not utilize an operant period nor did it structure the number of responses to be given beyond the minimum criterion of at least two responses per card for a subject to be included in the study. He found verbal no more effective than nonverbal reinforcing stimulus, when compared with the control group, with both effective at the .05 level of significance.

Gross (7) used no operant but did structure, via instructions, the number of responses to three per card. He reported no significant difference between verbal and nonverbal reinforced groups though both verbal reinforcement (significant at the .05 level) and nonverbal reinforcement (significant at the .02 level) were effective.

Wickes (32) utilized an operant period as well as a control group and structured, via instructions, the number

of responses to one per card for the thirty inkblots. The comparison within each group of the operant to conditioned blocks (fifteen cards each) showed significance at the .025 level for the verbal group, at the .005 level for the nonverbal group, and no significant difference for the control group.

It seems apparent that with more structure and more control incorporated within a study, a finer measurement of the effectiveness of verbal and nonverbal reinforcing stimuli becomes possible. While these studies report no significant differences between verbal and nonverbal reinforcing stimuli, higher levels of significance are reached by the nonverbal reinforcing stimuli in the studies by Gross (7) and Wickes (32).

A question for consideration that arises from these studies is the effect of the time between reinforcement and the preselected category. The experimenters presented the reinforcement after each appropriate response. How specific to the word or phrases, that permitted identification of the response as suitable for reinforcement, was it possible to present the reinforcing stimuli? Was the reinforcement injected at the point of identification or at the end of the series of words making up the total response? If the former was in operation, no further discussion is pertinent, however, if the latter was in operation, certain

implications seem appropriate for discussion. Does the reinforcing stimuli then become a gross type of reinforcement which may increase not only the preselected category but also the total number of words in a response? If such diversification did exist, could it have lessened the effectiveness of the reinforcing stimuli?

Therefore, it is contended that with a highly structured experimental situation more and faster conditioning will occur and more discrimination between the conditioning effects of verbal and nonverbal reinforcing stimuli will be possible which will reveal that nonverbal reinforcing stimulus can be more effective than verbal stimulus in altering verbal behavior.

Verplanck, in describing further research possibilities, included ". . . amenable to experimental investigation is that of the classes of events that reinforce human behavior" (30:81).

A single head nod (7, 15); three head nods, smile, and leaning forward used separately but in series (32); and a combined head nod, smile, and leaning forward (Ekman as reported by Krasner (13) have been effective in verbal conditioning. What then are the possibilities of the effectiveness of other nonverbal (gestural) reinforcements singly or in different combinations?

Previously cited studies show that nonverbal reinforcing stimuli of the gestural variety can be effective in verbal conditioning in test-like situations and as effective as verbal reinforcing stimuli. It is contended that nonverbal reinforcing stimuli can be more effective than verbal reinforcing stimuli in more structured situations which permit a finer measure of the effects of nonverbal reinforcing stimuli. Studies to support this contention were not located.

This contention arises from both speculative and theoretical considerations. Adages come to mind implying that the actions of people convey messages more impressively than speech, and that the content of speech is not as important as the manner in which it is said. This empirical assumption that actions or manner can be communicative implies that some nonverbal cue or cues do communicate in an interpersonal way which, while a part of the total communicative process, have a distinct or finer interpretative quality. Is it then possible that these finer discriminative cues are also more effective reinforcers?

This leads to discussion of the theoretical considerations arising from conditioning theory. It has been amply demonstrated that certain classes of verbal and nonverbal stimuli can be reinforcing. How does a specific stimulus become reinforcing? Perhaps only in terms of its own

conditioning history does a stimulus acquire this quality. Is it possible that words, such as "Good," gain the quality of being reinforcing by themselves being conditioned through interpersonal cues of the nonverbal variety as a smile or a nod? Is a child, before he acquires speech, conditioned to nonverbal interpersonal cues and subsequently the words become reinforcing in terms of generalization from the nonverbal cues? Furthermore, words such as "Good" have broad areas of application in that the word may be used in many contexts not directly related to the behavior of the individual, as a good day or a good cup of tea. Therefore, the word "Good" may not always be reinforcing for the particular behavior of the individual. The broad response potential may lessen the effectiveness of its reinforcing quality by virtue of requiring a discrimination as to whether this is a situation where "Good" is or is not reinforcing to the operant behavior.

Is it possible that words such as "Good" and "Fine" reach a state of satiation? Is "Good" used so much as a reinforcer that it loses its strength? The definition of satiation is implied by its operation, that is, it refers to a state achieved by an organism whereby reinforcement loses effectiveness or potency following its repeated application (12:73, 264, 274; 24:Ch. IX). "Good" and "Fine" may

well reach a state of satiation because of their broad response potentials.

Nonverbal cues too are subject to conditioning. Such conditioning begins with the very early sensory and perceptual experiences of an individual. However, the nonverbal cues as a smile and a nod consistently involve personal interaction, and therefore, are subject to more specific interpretation by the individual. As a result, when a smile or a nod becomes a reinforcing stimulus, there are no discriminations to be made.

Skinner (24:78) discussed several generalized reinforcers, which develop as the result of social interaction, among which are attention, approval, and affection and implied that a hierarchy of strength exists among these three. Attention becomes a reinforcer as attending is necessary for the interpretation or perception of other possible forthcoming reinforcements. Approval or the symbol of approval becomes reinforcing apart from the attention because it is more specific to a portion of the behavior--that being approved. Affection is described as an even stronger reinforcer.

Is it possible that a smile has more strength because of generalization, a conditioning history in the areas of attention, approval, and affection; whereas "Good" may not be as subject to conditioning in the area of affection? Is

it possible that a hierarchy of effectiveness or strength of cues or symbols of approval and/or affection exists?

Thus, the contention that, in a verbal conditioning experiment permitting a fine measure of the effects of verbal and nonverbal reinforcing stimuli, the nonverbal reinforcing stimulus will be more effective is based on the assumption that this class of stimuli is more discriminatory and more specific.

The experimental technique utilized the multiple-choice factor of the sentence completion experimental situation and adapted it to a word association technique with a preselected category for reinforcement. Two reinforcing stimuli were employed: verbal, "Good"; and nonverbal, smile and affirmative nod combination.

Research has shown that verbal behavior can be conditioned (see Table I). Attention has been redirected to the issue of whether verbal conditioning can occur without "awareness" and what kinds of reinforcing stimuli can effectively bring about "aware" and/or "unaware" conditioning. Typically "awareness" is defined as the cognizance of the subject of the reinforcement and its relation to a particular response class.

Verplanck (30) makes some general comments about awareness in motor operant conditioning. He states that

about one-half of the subjects are unaware of what response is conditioned hence conditioning and extinction can occur without awareness, that few subjects become aware of the type of reinforcement schedules, that awareness seldom appears to change the behavior, and that instructions seem to serve as discriminative stimuli.

Adams (1) discusses lack of awareness and named six areas with respect to which the subject may be unaware of the relationship to his behavior. The only type of behavior which can be experimentally established without awareness is that:

> . . . in which the subject knows <u>what</u> he is supposed to be discriminating, but does <u>not</u> know <u>that</u> he is discriminating, because of the absence of the usual sensory experiences to which he is accustomed under the given type of stimulation. . . (1:402).

Determination of awareness is usually based on the ability of the subjects to verbalize the purpose of the experiment. This has been determined by direct interview and/or questionnaire. Controversy results from these methods employed in and the criterion established for measurement of awareness. Question has been raised as to the adequacy of this criterion for awareness (27). It may well be that a subject has developed a working hypothesis within his own perceptual framework or has perceived discriminating stimuli that he cannot or will not verbalize or if verbalized does not meet this criterion of awareness.

Experimental evidence is lacking to state conclusively that awareness so defined by its criterion is or is not essential to learning (1).

Though awareness was not of prime concern in this study, a questionnaire was employed. The questionnaire utilized some of the questions of Greenspoon (6) in combination with those of the writer. The questionnaire was so structured as to permit verbalization of awareness, without implying that awareness was desirable or necessary, and some measurement of attitude on the assumption that attitude may determine susceptibility to conditioning. The questionnaire was utilized, despite the previously discussed criticisms, because it was related to the type of experiment undertaken. Would differences exist in the responses to the questionnaire between experimental groups because verbalization of awareness was easier when given a verbal cue? Or would the nonverbal cue be a more effective aid to verbalization because it was a more prominent cue to interaction? Would differences exist in general attitude? If the nonverbal reinforcing stimulus is more discriminating and more specific and, therefore, more effective, it is expected that the nonverbally reinforced subjects will show more awareness and a more positive attitude. The questionnaire may be found in Appendix A.

In light of the above considerations, the following hypotheses were formulated:

Hypothesis I

A nonverbal reinforcing stimulus will be more effective than a verbal reinforcing stimulus in bringing about a change in verbal behavior; specifically, the combination of a smile and an affirmative nod will be more effective than the word "Good" delivered in a neutral tone in bringing about verbal conditioning.

Hypothesis II

The awareness questionnaire will be more adequately answered by the nonverbally reinforced group than the verbally reinforced group; specifically, the nonverbally reinforced group will show more awareness as measured by a rating of question six and a more positive attitude as measured by question five than the verbally reinforced group.

CHAPTER II

METHOD AND PROCEDURE

The study was conducted in two phases. The first phase consisted of the preparation of an experimental word list. This word list, representing the stimulus words, was further developed into sets of words by adding words appropriate to four categories, one of which would be suitable for reinforcement in a multiple-choice word preference technique adaptable to a verbal conditioning study. Two pilot studies were undertaken. The results of the second pilot study permitted the selection of a category for reinforcement which appeared appropriate for the conditioning phase of the study.

The second phase of the study tested the effectiveness of specific verbal ("Good") and nonverbal (combined smile and single affirmative nod) reinforcing stimuli in the conditioning of word preferences by application of the reinforcement to the preselected category.

I. PHASE ONE

An experimental list of 190 words was compiled. The following criteria for the inclusion of a word in the experimental list were established: (1) must be a common word within the range of the average adult vocabulary; (2) must

fall within only one of the grammatical categories of common noun, active verb (present tense), adjective, or adverb; (3) must have no homonym; and (4) must have no prejudicial or hostile connotations nor colloquial derivations.

To meet the first criterion, words were utilized from Thorndike and Lorge's list of words with incidence of at least once per 1,000,000 words (28). Words were selected with the highest incidence when compatible with the stipulated criteria. To meet the second criterion, words selected for the grammatical categories were chosen so as to be as representative of each letter of the alphabet for each category as was feasible. The form of the word had to be suitable for one category only e.g., reb'el, n.; re'bel, v. would be eliminated. The Webster's Third New International Dictionary (4) served as the guide to determine if the form of the word was suitable for categorical classification. To determine that only words with no homonyms, no prejudicial or hostile connotations, and no colloquial derivations (criterion three and four) were included, the Webster's Third New International Dictionary again served as the guide.

The final selection of the words that met the criteria was the arbitrary choice of the writer.

The 190 words on the experimental list were randomly arranged. Each word was assigned a number and the numbers placed in a box. The first number drawn was the first word to appear in the booklet; the second number drawn designated the second word in the booklet. This procedure was followed until all words were assigned to the booklet.

Four type-of-response categories were established: (1) definitive or interpretive (21); (2) sequential (21); (3) other, including either a word of opposite meaning or, if such a word was not available, the part of speech of the stimulus word; and (4) unrelated. The words, selected for each type-of-response category for each stimulus word, were the arbitrary choice of the writer. The order of the four words representing each of the four type-of-response categories for each stimulus word was randomly selected.

Pilot Study I

The list of 190 sets of words was divided into two sublists designated as I, the first 95 sets of words, and A, the remaining 95 sets of words. Each set of words consisted of the stimulus word and the four words representing each type-of-response category.

The sublists were dittoed and compiled into two booklets of six pages each, seventeen sets of words for each of five pages with the remaining ten sets of words on the sixth

page. Identical initial pages were used for each booklet which contained the following instructions.

> You are being asked to participate in a research study. This is not a personality test. This is a study of personal word preferences--what kinds of words do college students prefer. Please write your name and age in years and months in the blanks provided.
>
> This booklet contains 95 sets of words: one appears above with four below. With each group of words look at the top word, then choose from the four words below the one that you prefer for any reason. Circle the word of your choice.
>
> Examples:
>
> red
>
> green noun (color) rose
>
> one
>
> (none) pretty adjective word
>
> Work as rapidly as you can. Circle the one word that you prefer for any reason. As you finish one page, go right on to the next. Are there any questions?
>
> Work as rapidly as you can and remember to circle the one word that you prefer for any reason. Begin!

The inclusion of "This is not a personality test." in the directions was deliberate. This was done in an attempt to (1) relieve any anxiety on the part of the subjects, (2) minimize any searching for an operational hypothesis on the part of the subjects (13:164), and (3) have the task completed as rapidly as possible, a function of (1) and (2).

The presence of the examples should not influence the subsequent responses. A study by Boyer and Elton (2) consisted of the administration of the Kent-Rosanoff Word Association Test to three groups of undergraduate college students with two of the three groups being given five examples of common and uncommon responses respectively and the third group serving as a control with no examples given. They suggested that any influence of examples on subsequent responses will be readily dissipated:

> . . . There was no apparent difference in responses after the sixth word among those students who were given common or "normal" response examples, those given atypical responses, and those given no example of responses to the stimulus words. . . (2:307).

The booklets were distributed alternately to sixty-seven students in General Psychology, Central Washington State College, Winter Quarter, 1964. The instructions were read aloud.

The four type-of-response categories were selected to be as representative of the familiar kinds of word relationships as was possible. Homonyms, as a category, could not be utilized because of the criteria established for the original stimulus word selection. While differences in category preferences were anticipated, it was assumed that there would be no gross differences. However, words within the definitive category received approximately 66 per cent

of the total responses. The definitive category was eliminated and was replaced by a rhyming category in both List I and List A. Certain sets of words were necessarily eliminated because a suitable rhyme for the stimulus word was not located.

Pilot Study II

List I and List A for the second pilot study consisted of eighty-three sets of words each. These sets were dittoed and combined into two five-page booklets, seventeen sets of words to each of the first four pages and fifteen sets on the fifth page. Initial pages of the booklets were identical to that of the first pilot study booklet except for changing the number of sets of words contained and changes in the examples appropriate to the new type-of-response category. The four type-of-response categories utilized for this pilot study were rhyme, sequential, other, and unrelated.

The booklets were distributed alternately to sixty students enrolled in General Psychology, Central Washington State College, Winter Quarter, 1964. These subjects were not involved in the first pilot study. The instructions were read aloud.

Final Word Set Selection

The 166 sets of words from the second pilot study, List I plus List A, were subjected to further alteration. The stimulus words for which no antonyms appeared in the other type-of-response category were eliminated. This involved thirty-one words for which a total of sixty-five responses were made to the part of speech in the second pilot study. This elimination was made to prevent the formation of conflicting operational hypotheses, reinforcement of antonyms versus reinforcement of parts of speech, for a single category. The other category will subsequently be known as the opposite category.

Stimulus words were selected by grammatical categories so that as nearly as possible equal representation of common nouns (N=35), verbs (N=29), adverbs (N=31), and adjectives (N=25) existed. When more than thirty stimulus words existed in a grammatical category, arbitrary selection was made with consideration given to as equal representation of the type-of-response category frequency as tallied in the second pilot study as was feasible.

The final word list contained 120 stimulus words each with four choice words representative of the type-of-response categories of rhyme, sequential, opposite, and unrelated.

II. PHASE TWO

This phase of the study utilized an adaptation of the multiple-choice factor of the sentence completion experimental situation to a word association technique with reinforcement of a preselected category. Two reinforcing stimuli were employed: verbal "Good" and nonverbal smile and affirmative nod combination. Three randomized groups matched as to sex were established: two experimental and one control. Four student experimenters were utilized.

Subjects

Eighty-four, forty-one male and forty-three female, undergraduate volunteers enrolled in beginning or lower division psychology classes at Central Washington State College during Spring Quarter, 1964, were assigned to two experimental and one control group. One experimental group was designated as the verbally reinforced group (GI), the second experimental group was designated as the nonverbally reinforced group (GII), and the third group was designated as the control group (GIII).

Experimenters

Four student volunteer experimenters, two male and two female, conducted this phase of the study. The experimenters were designated A, B, C, and D. All were currently

enrolled in a psychology class from which no subjects were selected. The age range was nineteen to twenty. The four experimenters had similar educational backgrounds in psychology. Physical differences in relation to height, weight, coloring, and general appearance were unavoidable. However, pronounced differences occurred only in hair coloring. While some height differential was in existence, the experimenters were always seated throughout each interview. Each experimenter wore a white shirt or blouse. The four experimenters were trained by the writer so that presentation of the reinforcing stimuli and the general procedures of reading instructions, handling materials, and recording responses were as nearly uniform as possible.

Materials

Materials consisted of 120 5" x 8" white cards on which the stimulus word and four response words were typed in capital letters. The 120 cards were joined by ring binders and placed on a small podium-shaped holder so that the cards could be flipped by the experimenter one at a time toward the subject. A recording sheet and pen or pencil were used by the experimenters to note the stimulus word and record the response word. A two-page questionnaire was completed by each subject.

Procedure

The subjects were interviewed in a counter-balanced order following a GI, GII, GIII, GIII, GII, GI plan in blocks of 4-3-4-3-4-3 subjects for experimenters A and C; specifically, each interviewed four subjects randomly assigned to GI, three subjects for GII, four subjects for GIII, three subjects for GIII, four subjects for GII, and three subjects for GI. Experimenters B and D followed a GII, GIII, GI, GI, GIII, GII plan with corresponding blocks of 4-3-4-3-4-3. Each of the experimenters was assigned subjects with as equal distribution of male and female subjects for each of the three groups as was possible.

Each subject was individually interviewed in a clinical setting. The subject was seated across the table facing the experimenter. The cardholder was on the table in front of the subject and the following instructions were read:

> This is a study of word preferences. You will find a word typed at the top of each of these cards and four words in the center. Read the top word aloud, look at each of the four words below, and then choose one of the four words for any reason. When you have made the choice, look at me, and tell me the word you have chosen. I will present the cards one at a time, read the top word aloud, look at each of the words below, and when you have made your choice, look at me, and tell me the word.
>
> Here is a sample. Now read the top word aloud, look at each of the words below, choose one word, look at me, tell me the word. Here is another sample.

Do you have any questions?

The experiment will continue until I tell you to stop. Let us begin.

The cards were arranged in a preselected random order so that each subject in each group saw the cards in the same order. The recording sheet showing the arrangement of the 120 sets of words appears in Appendix B.

The rate of response was established by the experimenter. In the event the subject changed his response, the final choice was that recorded.

Experimenters have used various ratios of operant responses to conditioning responses. Mandler and Kaplan (16) used 100 operant, 200 conditioning, and 200 extinction responses in a say words study thereby used a ratio of 1:2:2. Sapolsky (22) used a total of 160 cards in a sentence completion paradigm with the first 20 cards as operant, the next 60 as conditioning, and the last 80 as extinction thereby using a ratio of 1:3:4. Wilson and Verplanck (33) used a ratio of 100 operant to 300 reinforcement of one of two alternate responses with 100 no reinforcement and 300 reinforcement of the second of the alternate responses for a total of 800 words in a say words paradigm. In a second experiment they used a ratio of 100 operant, 300 conditioning, and 200 extinction.

This study was not concerned with extinction. A ratio of 1:3 was utilized in the establishment of blocks. The first thirty cards were considered the operant block. The remaining ninety cards were divided into three blocks of thirty cards each for the conditioning blocks.

GI was reinforced with "Good" delivered in a neutral tone on a 100 per cent reinforcement schedule for each response falling within the preselected category, opposites, and then the response recorded.

GII was reinforced with a smile and one affirmative nod on a 100 per cent reinforcement schedule for each response falling within the preselected category, opposites, and then the response recorded.

GIII received no reinforcement, but the response was recorded as for GI and GII.

The recording sheet was attached to a clipboard so that each subject was aware of the recording but could not, because of the slant of the clipboard as it was propped against the table edge, see what was being recorded.

The dittoed questionnaire (see Appendix A) was given to each subject for completion, with no comment by the experimenter beyond the request that the subject complete the form in the waiting room. The experimenter noted the date and the number of the subject for that day and circled the appropriate identifying data on the questionnaire

consisting of the experimental group, sex, and experimenter which data corresponded to identical identifying data on the recording sheet.

The eighty-four subjects were interviewed during the afternoon hours according to a schedule established by the available time of the student experimenters and the volunteer subjects. The interviews took approximately twenty to thirty minutes on the average. Six afternoons were utilized to complete the experiment.

Random observation was conducted by the student experimenters and the writer. Each student experimenter also served as his own observer by noting any deviations from procedure and other pertinent comments on the recording sheets.

All tallying of recording sheets and questionnaires was completed by the writer.

CHAPTER III

RESULTS

I. PHASE ONE

Pilot Study I

Tallying of the responses for List I and List A was done by type-of-response category. Two booklets were eliminated from the study as they were incomplete. List I completed by thirty-two subjects had a total of 3,040 responses. The probability of each type-of-response category was one in four or 760. List A completed by thirty-three subjects had a total of 3,135 responses. The probability of each type-of-response category was one in four or 784.

Results for List I and List A appear in Table II.

Chi square analyses revealed a significant deviation of the response frequencies from chance distribution beyond the .01 level of significance for List I and List A. Chi square equaled 2,848.428 for List I and 3,307.943 for List A.

In both List I and List A the definitive or interpretive type-of-response category exceeded probability, approximately 66 per cent of the total responses, whereas the other three categories did not reach the probability level expected by chance. The definitive category was

eliminated from consideration as the preselected category for the conditioning phase of the experiment and replaced in the second pilot study by a rhyming category.

TABLE II

RESPONSES BY TYPE-OF-RESPONSE CATEGORY FOR NINETY-FIVE SETS OF WORDS FOR LIST I AND LIST A

Category	List I (N = 32)	List A (N = 33)
Definitive	2,006	2,157
Sequential	545	534
Other	376	306
Unrelated	113	138
Total:	3,040	3,135

Pilot Study II

Tallying procedures were identical to that of the first pilot study. Three booklets were eliminated from the study. List I was completed by twenty-nine subjects for a total of 2,407 responses. Probability for each type-of-response category was one in four or 602. List A was completed by twenty-eight subjects for a total of 2,324 responses. The probability of each type-of-response category was one in four or 581.

Results for List I and List A appear in Table III.

Chi square analyses revealed a significant deviation of the response frequencies from chance distribution beyond the .01 level of significance for List I and List A. Chi square equaled 1,161.439 for List I and 490.638 for List A.

TABLE III

RESPONSES BY TYPE-OF-RESPONSE CATEGORY FOR EIGHTY-THREE SETS OF WORDS FOR LIST I AND LIST A

Category	List I (N = 29)	List A (N = 28)
Rhyme	326	457
Sequential	1,283	950
Other	595	686
Unrelated	203	231
Total:	2,407	2,324

The other category was within seven responses of probability in List I and exceeded probability in List A. Two criteria were established for selection of a category suitable for reinforcement in the conditioning phase of the study: (1) the frequency of choice must approximate the level expected by chance, and (2) the frequency of choice must not exceed such a level to the extent that a behavioral set would then be assumed in operation. Both criteria were met by the other category, subsequently known as the opposite category, and the opposite category was selected for

the category to be reinforced in the conditioning phase of the study.

II. PHASE TWO

Results of the tallying of responses for the opposite category for all three groups appear in Appendix C.

The 120 responses were divided into thirty-word blocks. Block 1 was designated as the operant block and Blocks 2, 3, and 4 were designated as the conditioning blocks.

Four crucial questions were analyzed. Was there conditioning? Was there any differential effect between groups? Was there a relationship between awareness and different treatment groups? Was there a relationship between attitude and different treatment groups?

First, was there conditioning? Several measures of conditioning were calculated including the comparison of the mean total responses between groups, the comparison of the mean number of responses for Block 4 between groups, and the comparison of a mean difference score, calculated between Block 1 and Block 4, within and between groups.

The comparison of the mean total responses was a crude measure for conditioning as the summation across blocks distorted the effects of individual blocks. Table IV shows the comparisons calculated for the means of the total

responses between Group I and Group II, Group I and Group III, and Group II and Group III. No significant differences were found in any of the comparisons at the .05 level of significance.

TABLE IV

COMPARISONS OF MEANS OF TOTAL RESPONSES BETWEEN GROUPS

Group	N	Mean	Comparison	t
I	28	58.57	I and II	.1008
II	28	57.93	I and III	.3091
III	28	56.54	II and III	.2353

The comparison of the mean number of responses for Block 4 between groups was also a crude measure of conditioning as the operant level was not utilized as a referent. Comparisons calculated between the mean number of responses for Block 4 between Group I and Group II, Group I and Group III, and Group II and Group III showed no significant differences. These results appear in Table V.

The mean difference score, calculated between Block 1 and Block 4, seemed the most appropriate statistic for a measure of conditioning. Block 1 was used as a referent; Block 4 seemed to represent the optimal effect of reinforcement. The frequency of responses in Block 2 may have been

affected by the introduction of the reinforcement necessitating some evaluation by the subject. The frequency of responses in Block 3 may have been affected by a testing of the evaluative process of Block 2 and/or may have provided a practice period.

TABLE V

COMPARISONS OF MEANS OF RESPONSES FOR BLOCK 4 BETWEEN GROUPS

Group	N	Mean	Comparison	t
I	28	15.82	I and II	.3496
II	28	15.14	I and III	1.4531
III	28	13.00	II and III	1.1837

Figure 1 shows the frequency of response curves for the opposite category for Group I, Group II, and Group III based on mean number of responses for each of the four blocks. Group I was reinforced by "Good" delivered in a neutral tone, Group II was reinforced by a combined smile and single affirmative nod, and Group III was the control group.

Inspection of the learning curve for Group I reveals the lowest mean number of responses for Block 1, the only increase between Blocks 1 and 2, and the greatest increase between Blocks 2 and 3 for any group.

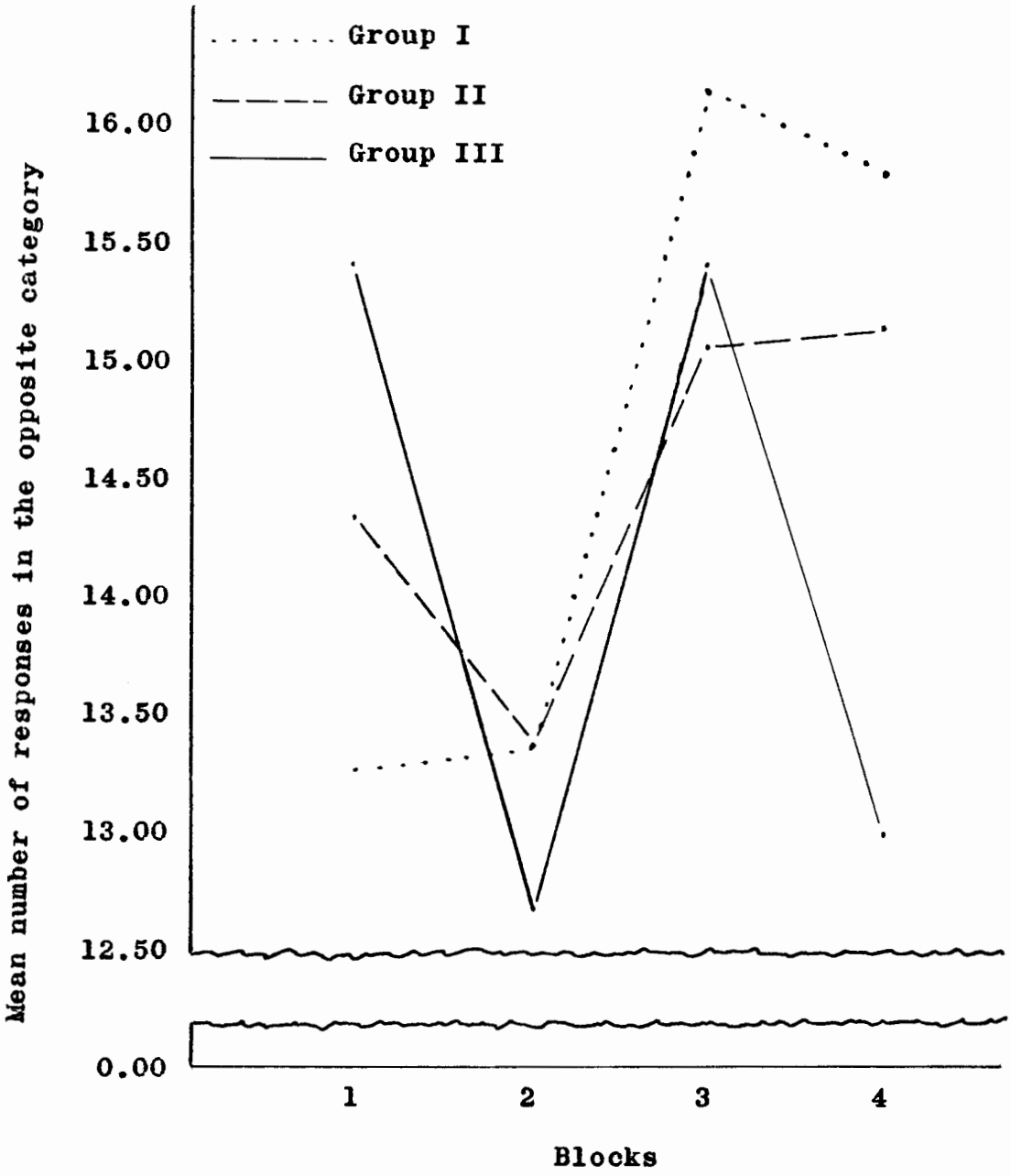

Figure 1. Mean number of responses in the opposite category for Group I, verbally reinforced group; for Group II, nonverbally reinforced group; and for Group III, control group.

The learning curve for Group II reveals a decrease between Blocks 1 and 2, an increase between Blocks 2 and 3, and a continuous increase through Block 4. This was the only curve to show a gain in Block 4 over Block 3.

The learning curve for Group III reveals the highest initial mean number of responses, a decrease between Blocks 1 and 2 to the lowest frequency of response for any group, a rise to the initial mean number of responses during Block 3, and a decrease during Block 4 to a point lower than any mean number of responses for either Group I or Group II.

A t-test of significance was calculated for the mean difference score between Block 1 and Block 4 for each group to determine if there was a significant change in frequency of response between Block 1 and Block 4. These results appear in Table VI.

Group I showed a significant increase in frequency of response between Block 1 and Block 4 beyond the .025 level of significance. Group II showed no significant increase between Block 1 and Block 4. Group III showed a significant decrease between Block 1 and Block 4 in frequency of response beyond the .01 level of significance. Therefore, using the mean difference score as the response measure, only Group I showed evidence of conditioning.

TABLE VI

RESULTS OF t-TESTS FOR THE MEAN DIFFERENCE SCORE BETWEEN BLOCK 1 AND BLOCK 4 FOR EACH GROUP

Group	N	Mean difference score	t
I	28	-2.57	2.3101*
II	28	- .79	.7634
III	28	2.43	2.6503**

*p< .025
**p< .010

A comparison of these mean difference scores was calculated between groups to determine if the change in the frequency of response between Block 1 and Block 4 was significantly different. These results appear in Table VII.

TABLE VII

COMPARISONS FOR THE MEAN DIFFERENCE SCORE BETWEEN BLOCK 1 AND BLOCK 4 BETWEEN GROUPS

Comparison	t
I and II	1.1779
I and III	3.4678**
II and III	2.3325*

*p< .025
**p< .005

The increase in frequency of response between Block 1 and Block 4 for Group I was significantly greater than that for Group III beyond the .005 level of significance. The increase in frequency of response between Block 1 and Block 4 for Group II was significantly greater than that for Group III beyond the .025 level of significance. There was no significant difference between the increased frequency of response for Group I and Group II.

Was there any differential effect between groups? The results as presented in Table VII revealed differences between the experimental and control groups. However, there was no difference between the experimental groups. Furthermore, an analysis of variance was computed, using the mean difference score, without differentiating the sex of subject. No significant difference was found in the effect of the experimenters or in the interaction between experimenters and reinforcing conditions. A significant difference was found in the effect of the reinforcing conditions beyond the .01 level of significance.

A second analysis of variance was computed based on the mean difference score and differentiating between sex of subject. A harmonic mean of cell frequencies (34:242) was utilized in the analysis because of the differences in number of subjects within cells. The results appear in Table VIII.

TABLE VIII

SUMMARY OF THE ANALYSIS OF VARIANCE

Source of variation	Sum of squares	d.f.	Mean square	F
E: Experimenters	173.4998	3	57.8332	2.1488
R: Reinforcing conditions	364.7342	2	182.3671	6.7761*
S: Sex of subjects	23.3816	1	23.3816	
E X R	212.7315	6	35.4552	1.3174
E X S	71.4756	3	23.8252	
R X S	47.0529	2	23.5264	
E X R X S	224.1761	6	37.3626	1.3882
Error: Within treatments	1,614.7841	60	26.9130	
Total:	2,731.8358	83		

*$p < .005$

There were no significant differences in effects or interactions except for the effect of reinforcing conditions which was significant beyond the .005 level of significance.

While no significant difference was revealed for the interaction between experimenters and sex of subject, inspection of response curves for each sex for each experimenter (see Figures 2, 3, 4, and 5) indicated that the experimenters did appear to function in different ways. Therefore, orthogonal comparisons combining pairs of experimenters were calculated. A significant difference in means over the three experimental conditions was found between paired experimenters A (male) and B (female) and paired experimenters C (female) and D (male) beyond the .025 level of significance. No other orthogonal combinations of pairs revealed significant differences.

Was there a relationship between awareness and different treatment groups? Was there a relationship between attitude and different treatment groups? Awareness and attitude were determined by specific questions on the questionnaire. Of the four questions concerning awareness, question 6 and of the two questions pertaining to attitude, question 5 were more specifically worded and, therefore, more objectively scored. Furthermore, answers to the other

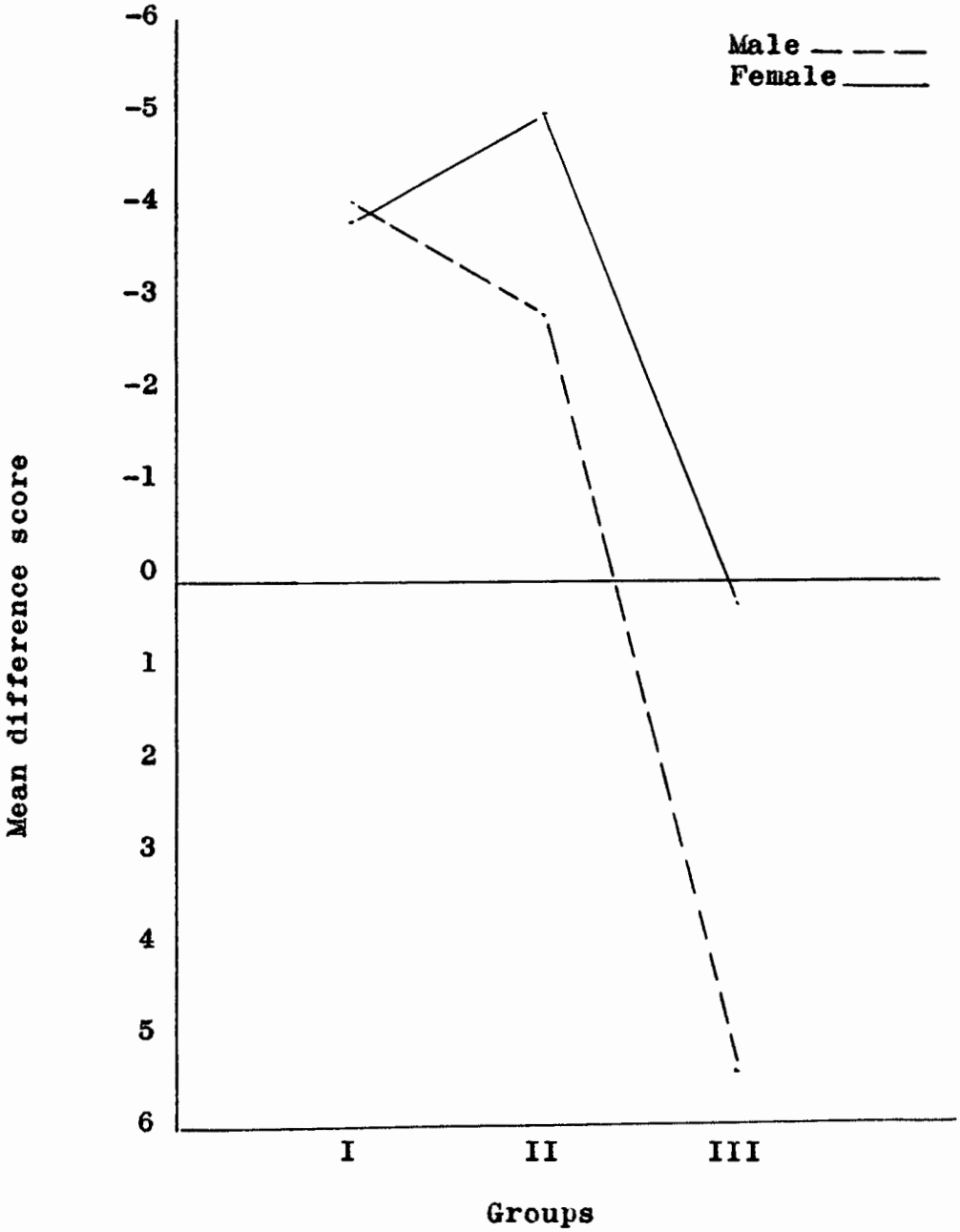

Figure 2. Mean difference scores for male and female subjects interviewed by Experimenter A--male--for Group I, Group II, and Group III. A minus score indicates an increase in the final conditioning block over the operant block.

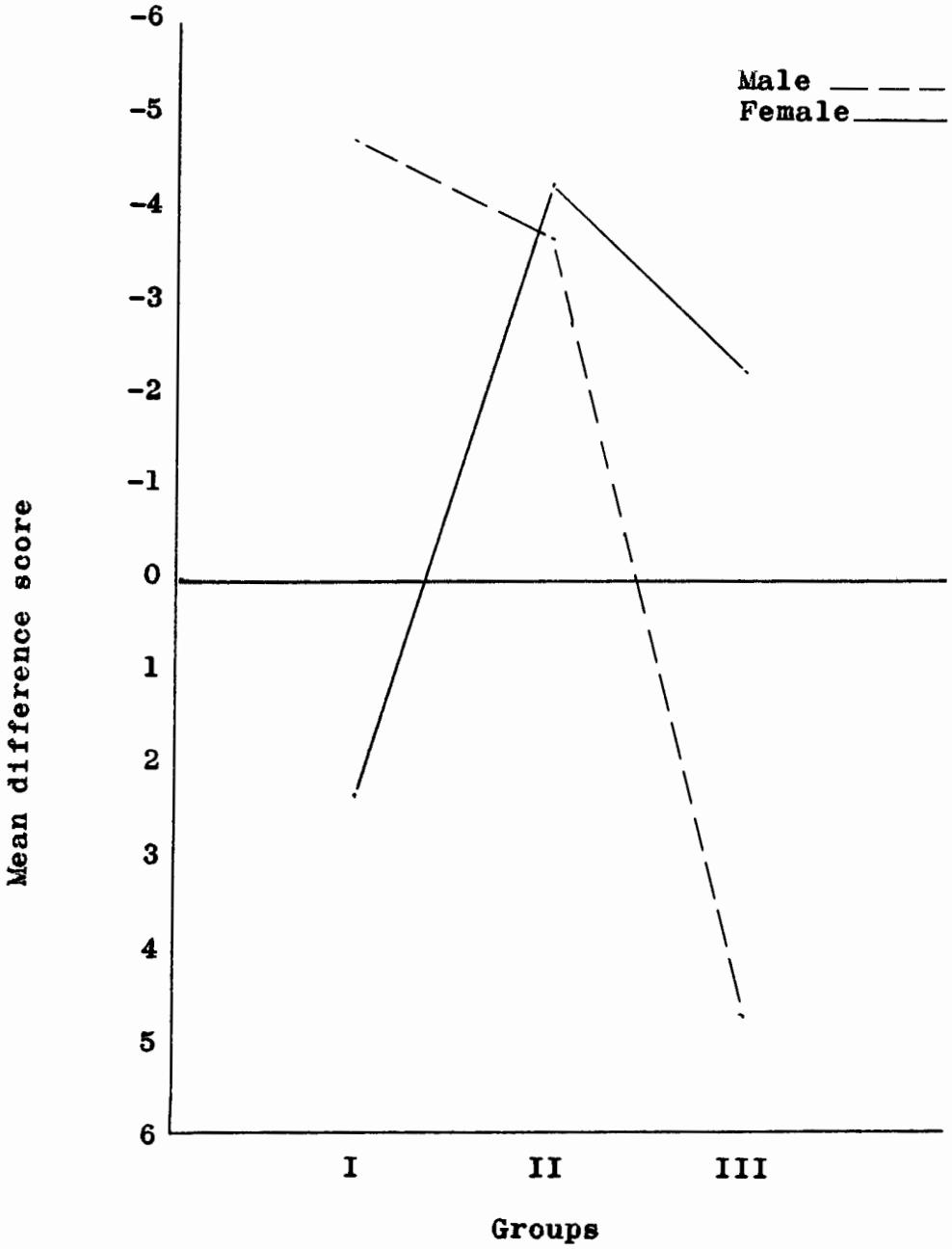

Figure 3. Mean difference scores for male and female subjects interviewed by Experimenter B--female--for Group I, Group II, and Group III. A minus score indicates an increase in the final conditioning block over the operant block.

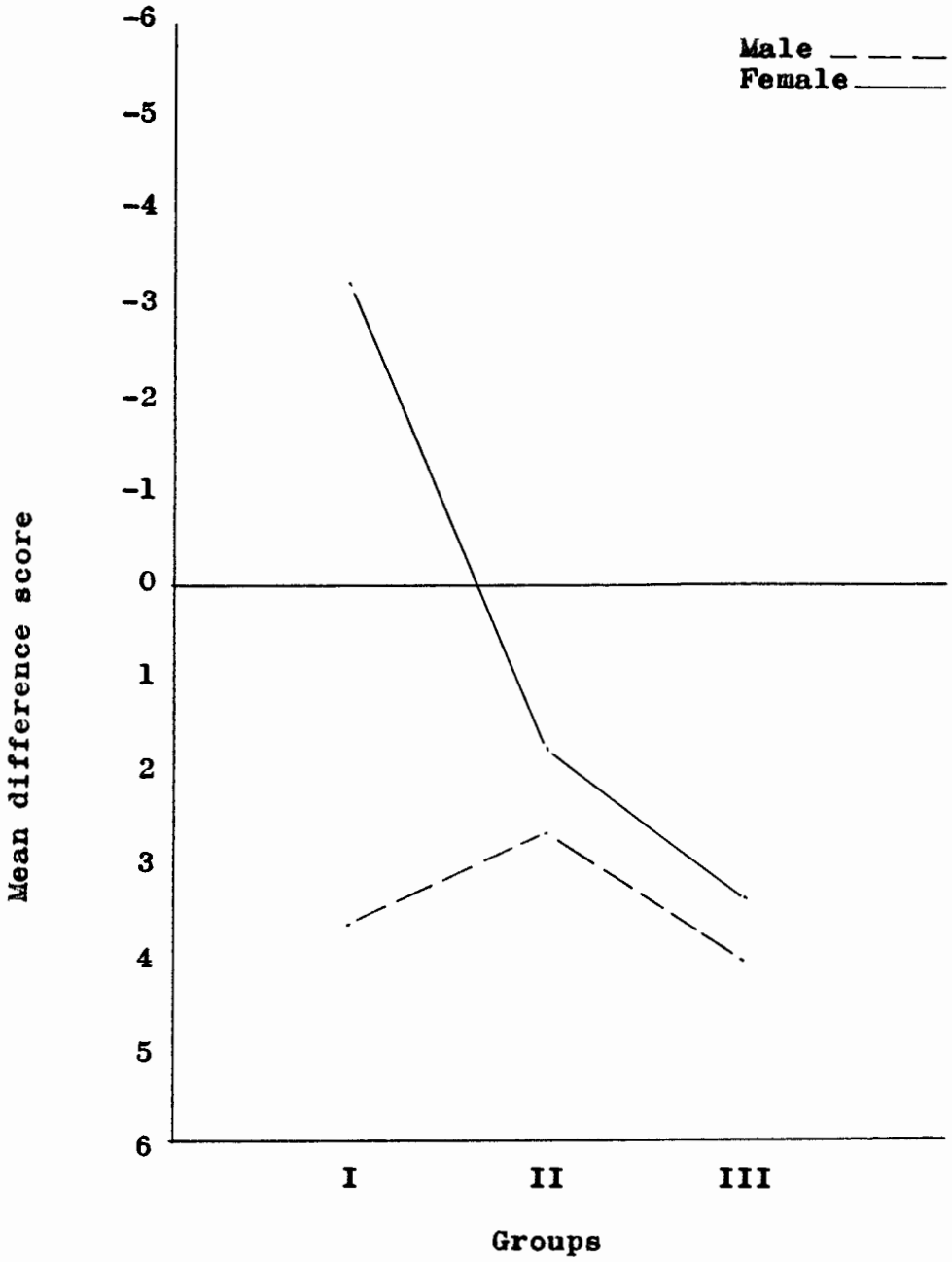

Figure 4. Mean difference scores for male and female subjects interviewed by Experimenter C--female--for Group I, Group II, and Group III. A minus score indicates an increase in the final conditioning block over the operant block.

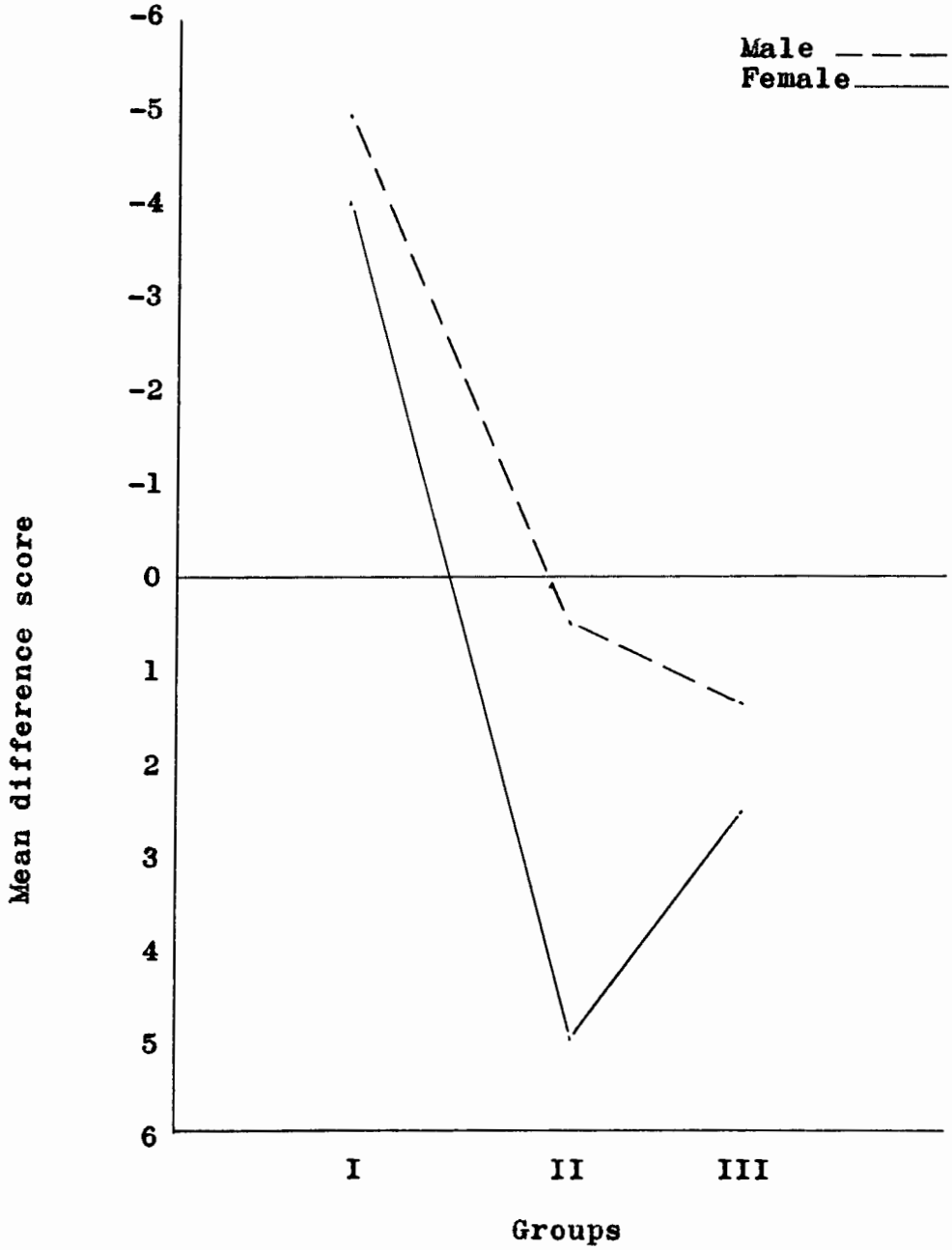

Figure 5. Mean difference scores for male and female subjects interviewed by Experimenter D--male--for Group I, Group II, and Group III. A minus score indicates an increase in the final conditioning block over the operant block.

questions may have been confounded by this more specific wording.

Question 6, "What kind of words do you think caused the experimenter to say, 'Good' (smile and nod)?", was scored 1 when a specific statement was made that opposites were required; all other answers were scored 0. Question 5, "Did you think this was ___a. fun? ___b. interesting? ___c. of no particular interest? ___d. uninteresting? ___e. stupid?", was scored 1 for either fun or interesting, 0 for no particular interest, and -1 for uninteresting or stupid.

Awareness was revealed by 64 per cent of the subjects in Group I, 50 per cent of the subjects in Group II, and 4 per cent of the subjects in Group III.

A positive attitude toward the experiment was revealed by 68 per cent of the subjects in Group I, 89 per cent of the subjects in Group II, and 82 per cent of the subjects in Group III.

Comparisons of the means of the summation of the awareness and attitude scores, the awareness scores, and the attitude scores between groups appear in Table IX.

Inspection revealed that there were no significant differences between the summed awareness and attitude, the awareness, and the attitude mean scores between Group I and

TABLE IX

COMPARISONS OF THE MEANS FOR AWARENESS AND ATTITUDE, AWARENESS, AND ATTITUDE BETWEEN GROUPS

Group	N	Mean			Comparison	t		
		Aw + Att	Aw	Att		Aw + Att	Aw	Att
I	28	1.32	0.64	0.68	I and II	.3657	1.0720	1.6481
II	28	1.39	.50	.89	I and III	2.7505*		1.1243
III	28	.86	.04	.82	II and III	3.4605*		.6623

*$p < .005$

Group II. However, there was directional support for the existence of a more positive attitude in Group II.

Both Group I and Group II revealed significant differences for the summed awareness and attitude mean scores beyond the .005 level of significance when compared with Group III. No significant differences were found in the comparisons of the attitude mean scores of the two experimental groups with the control group. Comparisons of awareness mean scores between Group I and Group III and Group II and Group III were not calculated as only one subject in Group III indicated awareness. As no significant differences in attitude were revealed, it was assumed that the significant differences found for the mean summed scores were based largely upon awareness.

The male and female mean scores within each group for summed awareness and attitude, awareness, and attitude were compared. These results appear in Table X.

Significant differences between male and female mean scores within groups were found only in Group III. The female mean score for summed awareness and attitude was significantly greater than the male mean score beyond the .005 level of significance. A more positive attitude for the female subjects was revealed beyond the .01 level of significance.

TABLE X

COMPARISONS WITHIN GROUPS BETWEEN MALE AND FEMALE SUBJECTS FOR AWARENESS AND ATTITUDE, AWARENESS, AND ATTITUDE

		GROUP I			GROUP II			GROUP III		
	Sex	N	Mean	t	N	Mean	t	N	Mean	t
Aw + Att	F	15	1.40	.5714	14	1.50	.8223	14	1.07	2.8421**
	M	13	1.23		14	1.29		14	.64	
Aw	F	15	0.73	1.0571	14	0.50	.3659	14	0.07	1.00
	M	13	.54		14	.43		14	.00	
Att	F	15	0.67		14	0.93	.4477	14	1.00	2.6897*
	M	13	.69	.1211	14	.86		14	.64	

*$p \leq .01$
**$p \leq .005$

The subjects in Group I and Group II were reassigned to aware and unaware groups on the basis of question 6. The aware group numbered thirty-two with nineteen female and thirteen male subjects; the unaware group numbered twenty-four with ten female and fourteen male subjects.

A t-test was computed using the mean difference score. The aware group showed an increased frequency of response in the opposite category significantly greater than the unaware group beyond the .025 level of significance.

A t-test analysis within the aware group between subjects of Group I and subjects of Group II revealed no significant difference in the mean difference score computed between Block 1 and Block 4.

A similar analysis within the unaware group revealed that the mean difference score of Group I was significantly greater than the mean difference score for Group II beyond the .005 level of significance.

Using the mean difference score between Block 1 and Block 4 as the appropriate measure, only Group I showed evidence of conditioning. However, both Group I and Group II showed evidence of conditioning when compared to Group III, the control group. Therefore, conditioning and a differential effect between groups was revealed.

The aware group showed evidence of conditioning whereas the unaware group did not. Within the unaware

group, Group I showed evidence of conditioning and Group II did not. Using the mean awareness score, Group I and Group II revealed significantly more awareness than Group III. Therefore, a relationship between awareness and different treatment groups was in evidence.

Using the mean attitude score, no significant differences were revealed. Therefore, different attitude groups were not established. No evidence of a relationship between attitude and different treatment groups was revealed.

CHAPTER IV

DISCUSSION

I. PHASE ONE

The purpose of this phase of the study was the preparation of a word list, composed of 120 stimulus words and words representative of four categories for each stimulus word, and the subsequent identification of a category suitable for the conditioning phase of the study. Two pilot studies were conducted, the results of which permitted the designation of the category to be reinforced in Phase Two. The criteria established for the selection of the category consisted of (1) the frequency of choice must approximate the level expected by chance, and (2) the frequency of choice must not exceed such a level to the extent that a behavioral set would then be assumed in operation.

Pilot Study I

In both List I and List A, the definitive or interpretive type-of-response category exceeded probability, accounting for approximately 66 per cent of the total responses. The three remaining categories did not reach the chance probability level. It was, therefore, assumed that a strong behavioral set was in operation.

Words appear to become a part of the speaking and reading vocabulary by knowledge of the definition or interpretive quality. A small child is introduced to words by the identification of the word as an interpretation of a concrete object as cat, light, mother, or toe. Abstractions are also introduced as definitive or interpretive of feelings or situations as hot, pretty, hurt, or sleepy. The expanding vocabulary is acquired by the need for more words to communicate more precisely. Words must be used in proper context and this requires an understanding of the meaning of the word. Appropriate sequential, opposite, unrelated, or rhyming relationships may well be acquired only after the definitive or interpretive quality of a word is learned. This does not, however, eliminate the contribution of such relationships to learning the meanings of new words, but the understanding of the meaning of a word appears to be essential before the word can contribute to the meaning of another unfamiliar word. A discussion of the correctness or accuracy of acquired meanings and the correctness or accuracy of applying these acquired meanings to other words or word relationships or the effects of contextual clues within words, which facilitate identification of meaning or word relationships, will not be attempted.

The definitive or interpretive type-of-response category was eliminated because of failure to meet the second

criterion. As no other category met the first criterion, a second pilot study was undertaken with a rhyme type-of-response category replacing the eliminated definitive category.

Pilot Study II

The sequential category responses in List I were double probability expectations, and in List A approximated that level. A behavioral set appeared to be in operation. In the absence of the definitive category and within the context of the alternative choices, it seemed reasonable that the sequential category might score higher than chance probability. Contact with words is customarily in relation to or in sequence with other words. The structure of sentences is based on the interrelationships of words according to their particular grammatical function. Words become more communicative when structured by other words which appear frequently in direct sequence. Reading and speaking activities require a sequence of words.

The other category was within seven responses of probability in List I and exceeded probability in List A. Both criteria were met and the other category, subsequently known as the opposite category, was selected as the category for reinforcement. This selection did not assume that in the absence of both definitive and sequential categories

a behavioral set might not be revealed for the opposite category in the context of the remaining categories. However, for the purpose of this experiment, the opposite category seemed appropriate for determining the effects of reinforcement because the probability level was achieved and because of the evidence of competition with a behavioral set.

The results of the two pilot studies supported an assumption of a hierarchy of word preferences. Choice of a word as related to a stimulus word appeared to be preferred, in descending order, as definitive, sequential, other or opposite, rhyme, and unrelated.

Definitive relationships may acquire a stronger preference strength by the learning process and subsequent application in the use of words in other types of relationships. Sequential relationships may acquire preference strength through the continual application of words to communicative activities. Opposite relationships may acquire preference strength to the degree they contribute to the original learning process and subsequent communicative activities. Rhyme relationships may acquire preference strength through a restricted application in communicative activities. Unrelated relationships perhaps are determined only after the elimination of the other relationships with stronger preference strength and more frequent usage.

Perhaps this assumption is no more than an awareness of the learning process for words would indicate. The process of acquiring facility with words may develop through understanding the meaning of words with discrimination of other word relationships dependent upon it, and preference strength may develop in varying degrees related to actual experience with activities requiring the specific relationships. In this study the elimination of the definitive category required the application of the meaning of a word to more restricted relationships.

II. PHASE TWO

The purpose of this phase of the study was the determination of the relative effectiveness of specific verbal and nonverbal reinforcing stimuli. Four crucial questions were analyzed. Was there conditioning? Was there any differential effect between groups? Was there a relationship between awareness and different treatment groups? Was there a relationship between attitude and different treatment groups?

Was there conditioning? The selection of the mean difference score as the more appropriate measure of conditioning in this study has been discussed. Using this measure, Group I revealed significant conditioning; Group II

revealed no conditioning; Group III revealed a significant lack of conditioning.

Certain factors may have inhibited the effectiveness of the smile and affirmative nod combination used as the reinforcing stimulus in Group II. Comments of some of the subjects after the completion of the study indicated that the smile was subject to varied interpretation. The smile was disruptive to some of the subjects. Perhaps a smile was an inappropriate reinforcer for college students in a research situation in which the smile was subject to interpretation as an objective approval of a specific behavior of the individual rather than interpretation as a general subjective approval of the individual. Perhaps a smile and affirmative nod combination cannot be presented as uniformly as "Good" delivered in a neutral tone. Perhaps the attempt at uniformity inhibited the spontaneity and/or sincerity value as interpreted by the subjects.

The selection of words in the opposite category appeared to be significantly avoided in Group III so that the response pattern resembled extinction behavior. A more dominant response pattern appeared to be in operation and became more apparent because no competing response was structured. Probability would suggest that the selection of opposites would occur as frequently in the final block as in the operant block. That behavior tends to become more rigid

under stressful conditions may account for the maintenance of this response pattern. However, if the situation was stressful, no evidence of this effect on attitude was apparent.

Using the mean difference score calculated between Block 1 and Block 4 as the measure of conditioning, "Good" was a significant reinforcer for the opposite category within Group I. Group III revealed a significant decrease in responses in the opposite category within the group. A significant difference was expected in the comparison of Group I and Group III. While a combined smile and affirmative nod did not reveal significant conditioning effects within Group II, the reinforcing stimulus apparently was effective in altering response patterns. The mean difference score of Group II was significantly greater than the mean difference score of Group III.

Neither of the cruder measures of conditioning revealed significant differences between groups. Therefore, the significant differences discussed here between both experimental groups as compared with the control group implied that some change in response pattern in the desired direction did occur between Block 1 and Block 4 which may be attributed to the effects of the reinforcing stimuli.

The frequency of response curves (see Figure 1, page 41) based on the mean score for each block for Groups I,

II, and III presented some interesting contrasts. The drop in the final block of conditioning for Group I may be explained by the variability of learning or perhaps "Good" was not as stable a reinforcer because the broad response potential of the stimulus permitted satiation, a reduction in the further effectiveness of a reinforcer, to be achieved.

The decrease in Group II between the operant mean and the first conditioning block mean may be explained by the introduction of the reinforcing stimulus which perhaps required some discriminating activity. That a similar reaction did not occur within Group I can perhaps be attributed to differences in the evaluation of the verbal and nonverbal reinforcing stimuli. Perhaps "Good" was the more generalized reinforcer while the smile and affirmative nod required more specific evaluation and subsequent application to the specific activity. A smile and nod may be a more specific social reinforcer appropriate to agreeable and cooperative behavior. The experimental situation structured opposites as the behavior required for reinforcement. While the stimulus words were not hostile, negative, or unpleasant, the choice words in the opposite category could not avoid these qualities. The reinforcement was thus allied with a category which was contradictory in emotional tone. Therefore, a smile was perhaps an inappropriate

reinforcer for this experimental situation. However, Group II showed a subsequent continuous rise throughout the last block of conditioning. Perhaps once this specific activity was evaluated in these terms, it became more acceptable, the positive reinforcing effects overcame the negative activity effects. Perhaps the experimenters became more adept with their smiles as the increased frequency of choice permitted more frequent smiles and any fatigue or tenseness was eased as the interviewing session neared its end.

Group III presented an atypical curve in that extreme changes in blocks were in evidence. The final block mean dropped below that of the operant block. The operant block indicated an apparent though not significant preference for the opposite category compared to the operant blocks of Groups I and II. A reoccurrence of this preference was evident in Block 3. Why was this category significantly avoided in Block 4? Was the curve representative of a swing between two competing response categories? The results of the second pilot study would support the contention that two response patterns were possible within the available type-of-response categories.

The particular words, both stimulus and choice, randomly assigned to Block 3 may have, in some way, contributed to the selection of the word representing the

opposite category thereby accounting for the rise in this block for all three groups. That this speculation does not hold for the other blocks of words was apparent in the differences in curve directions for the other conditioning blocks of the three groups. Comments by the experimenters of deviations from prescribed experimental procedure showed that a total of thirteen words were pronounced during the experiment by the experimenters for the subjects. Nine of these words occurred in Block 3 with six words pronounced for three subjects in Group I, six words pronounced for four subjects in Group II, and one word pronounced for one subject in Group III. If the pronunciation was assumed as contributing to the effectiveness of the reinforcement, that is further interaction between the experimenter and the subject, inspection of the response patterns of the eight subjects involved did not indicate support for the assumption. Four subjects showed a decrease in frequency of response during Block 3 compared to the operant, one subject maintained the same frequency, and three subjects showed an increase. The comparison of the frequency of response for Block 4 with the operant revealed that six of these subjects' frequency of response decreased, one remained the same, and one increased.

Was there any differential effect between groups? The analysis of variance revealed a significant difference

in the effect of the reinforcing conditions. Specific t-tests between Group I and Group III and Group II and Group III supported this finding. No significant differences were found in other effects or interactions.

While no significant difference was found in the interaction of experimenters and sex of subject, the curves plotted for each experimenter for male and for female subjects (see Figures 2, 3, 4, and 5; pages 47, 48, 49, and 50) suggested that the experimenters were functioning in different ways. The use of the statistical mean in the analysis of variance assimilated the individual differences apparent in these curves. The orthogonal comparisons did reveal a significant difference between paired experimenters A (male) and B (female) and paired experimenters C (female) and D (male).

Male subjects tended to respond more frequently to "Good" than to the smile and nod combination, and the female subjects tended to respond more frequently to the smile and nod combination than to "Good" for experimenters A and B. The reverse tendency was revealed for Experimenter C. Both male and female subjects interviewed by Experimenter D tended to respond more frequently to "Good" than to the smile and nod combination. However, the results of the analysis of variance did not support the supposition that sex of subject may be a variable in the effectiveness

of such reinforcing stimuli as "Good" and a combined smile and affirmative nod.

A variation in interviewing schedules of the experimenters occurred due to scheduling difficulties. Each experimenter interviewed the same number of subjects. Experimenters A and B completed the interviews in three afternoons; experimenters C and D completed the interviews in five afternoons with the last afternoon occurring after a three-day interval. However, inspection of the response patterns of the first and last subjects of each experimenter did not indicate any time differential effect.

Any attempt to explain the significant difference between one and the other combination of male and female experimenters can only be conjecture on subtle personality factors as range of voice tone, posture related to head and shoulder carriage, eye activity, and appearance of face in repose.

That the specific verbal stimulus "Good" can be effective as a reinforcing stimulus has been amply demonstrated. Krasner (13:160) reported positive results in eleven verbal conditioning studies and negative results in three verbal conditioning studies using gestural reinforcing stimuli. One study used a combined head nod, a smile, and leaning forward movement and the other used head nods, smile, or lean forward separately but in repeated series.

Negative results were reported for one study using a head nod as the reinforcing stimulus. No study was located which utilized the specific combination of a smile and an affirmative head nod as the reinforcing stimulus which was used in this study.

The results of this verbal conditioning study utilizing a word preference situation provided further experimental evidence attesting to the effectiveness of "Good" as a reinforcing stimulus. A combined smile and affirmative nod was also found to be effective as a reinforcing stimulus.

However, no experimental evidence was found to support the first hypothesis that the combined smile and affirmative nod would be more effective than "Good" in bringing about verbal conditioning. While both the specific verbal and nonverbal reinforcing stimuli were found effective, the nonverbal reinforcing stimulus was not more effective than the verbal reinforcing stimulus.

Was there a relationship between awareness and different treatment groups? Was there a relationship between attitude and different treatment groups? Awareness was determined by the ability to precisely state that the opposite category was being reinforced. Attitude was determined on the basis of a scaled five-item check list.

Significant differences were found between Group I and Group III and Group II and Group III in the comparison of means of the summed awareness and attitude scores. No significant difference was revealed between Group I and Group II.

As only one subject in Group III indicated awareness, comparisons of the mean awareness scores between Group I and Group III and between Group II and Group III were not calculated. No significant difference was revealed for awareness between Group I and Group II.

No significant differences were found in the comparisons of mean attitude scores. Therefore, the significance in the summed comparisons was the result of the awareness revealed by Group I and Group II.

Both verbal and nonverbal reinforcing stimuli appeared to significantly contribute to awareness but did not significantly affect attitude.

While no significant difference was found between mean attitude scores of Group I and Group II, there was strong directional support for a more favorable attitude in Group II. Perhaps without other social reinforcement, "Good" was not conducive to a positive attitude. The broad response potential may have permitted "Good" to have been associated with unpleasantness arising from sarcasm or impatience.

Groups II and III were combined and the mean attitude score compared with that of Group I. The combined Group II and Group III mean attitude score revealed a significantly more positive attitude beyond the .05 level than Group I. The combined effects of a social reinforcer such as a smile and affirmative nod and no reinforcement appeared to produce a more positive attitude than "Good" delivered in a neutral tone.

Groups I, II, and III were divided into male and female subjects. The t-test analyses of the awareness plus attitude, awareness, and attitude mean scores revealed no significant differences between male and female subjects within either Group I or Group II.

Group III analyses revealed the female subjects' mean summed score to be significantly greater than that of the male subjects. However, as no significant difference in awareness was found, the significance of the summed score was based largely on the attitude score. The female subjects showed a significantly more favorable attitude than the male subjects.

The analysis of the mean difference score between aware and unaware subjects, reassigned from Groups I and II, revealed a significant increase in frequency of response by the aware group. Inspection of the mean difference score for the unaware group revealed the operant block frequency

was greater than the final conditioning block frequency. As a group, the unaware subjects did not condition. The variability in individual difference scores within the aware and the unaware groups did not permit the conclusion that conditioning was dependent upon awareness. However, it was concluded that awareness appeared to be conducive to an increase in frequency of response.

The aware and unaware groups were subdivided into Group I and Group II. Analysis of the mean difference scores revealed no significant difference between the aware verbally reinforced group, Group I, and the aware nonverbally reinforced group, Group II. However, a similar analysis between the subdivided unaware group revealed the frequency of response of the unaware verbally reinforced group, Group I, increased significantly over the frequency of response for the unaware nonverbally reinforced group. Inspection of the mean difference score for the unaware nonverbally reinforced group revealed that conditioning did not occur. It seemed, therefore, that "Good" was an effective reinforcer without awareness, while the combined smile and affirmative nod was not effective without awareness. Perhaps the nonverbal reinforcing stimulus was a more specific or discriminating stimulus and required awareness of the relationship between the response category and the stimulus before it could be effective.

Both verbal and nonverbal reinforcing stimuli contributed significantly to awareness but had no significant effect upon attitude. However, the combined effects of a smile and affirmative nod combination and no reinforcement did contribute to a significantly more positive attitude than "Good."

Sex of subject did not significantly affect either awareness or attitude in the reinforced groups. The female subjects had a significantly more positive attitude than the male subjects in the control group.

There appeared to be no significant differential effect on frequency of response between "Good" and the combined smile and affirmative nod for aware subjects. However, "Good" was significantly more effective in increasing frequency of response than the combined smile and affirmative nod for unaware subjects.

No experimental evidence was found to support the second hypothesis that the nonverbally reinforced group would show more awareness and a more positive attitude. There was no significant difference in either awareness or attitude between the verbally and nonverbally reinforced groups. While no difference between effectiveness of the verbal and nonverbal reinforcing stimuli was found in the aware group, "Good" was an effective reinforcer whereas a

combined smile and affirmative nod was not in the unaware group.

The results of the study raised certain questions. Are there subtle personality factors that may enhance or detract from the reinforcement effectiveness of these specific reinforcing stimuli? Are these subtle personality factors separate entities that could be fitted into an assumed hierarchy of reinforcing stimuli or merely a part of the complexity of the conditioning process by which the specific stimuli gain reinforcement value? Is the conditioning process by which "Good" becomes reinforcing different for males and females? Is the conditioning process by which a smile and an affirmative nod becomes reinforcing different for males and females?

Enlightenment in these areas would come only through extensive research. The research would necessarily be in two directions. The first direction would be the accumulation of experimental evidence to determine the hierarchy of reinforcement stimuli in two areas, verbal and nonverbal. Is there a difference in the reinforcing value of "Yes," "Fine," "Good," and "All right" used independently? Is there a difference in the reinforcing value of a smile, a nod, an attentive glance, and a tilting of the head to the side used independently?

The other direction for research would be to provide clues about the conditioning history of a reinforcing stimulus. Which of the verbal and nonverbal stimuli have reinforcing value for preschool children, preadolescents, adolescents, and adults? Do preschool children respond to the verbal and nonverbal reinforcing stimuli to the same degree as preadolescents, adolescents, and adults?

The design of this study would have been improved by the alteration of several factors. Matching of the experimenters on personality factors determined by a battery of appropriate personality tests may have permitted a more implicit recognition of the particular reinforcement value of the reinforcing stimuli employed. More extended practice sessions prior to the study might have permitted more uniformity in the presentation of the nonverbal reinforcing stimulus by the experimenters.

The use of less sophisticated subjects might have permitted finer discriminations between both the reinforcement values of the stimuli and awareness. The experiment was conducted toward the end of the quarter and many of the subjects had studied learning and conditioning theory.

The extension of the number of blocks of conditioning to four might have permitted finer discriminations. If the introduction of the experimental conditions of reinforcement in Block 2 did require an evaluation on the part of

the subject with subsequent effect upon the pattern of responses, two blocks of conditioning, Block 3 and Block 4, may not have been adequate to permit stabilization of the new response pattern. If the smile and affirmative nod combination was a more specific and discriminating reinforcer appropriate to agreement, the choosing of opposites may have been disruptive to the effectiveness of this reinforcing stimuli. Added responses made possible by an extension of the number of conditioning blocks might have overcome this contradictory effect.

The introduction of such variables as "Good" and a smile and nod into the interaction of individuals in a setting involving verbal behavior can effect a change in the verbal behavior. Teachers and counselors could use these variables as additional tools in encouraging desired responses in learning tasks as well as social behavior. Examiners in a testing situation should be aware that verbal and gestural activity, customarily associated with personal interactions, may have an effect upon the test behavior of the subjects.

CHAPTER V

SUMMARY AND CONCLUSIONS

This was a study of verbal conditioning utilizing the Skinnerian model of operant conditioning in which a response is emitted and reinforcement is given to a designated category of response (13).

The purpose of this study was to determine the relative effectiveness of a specific verbal reinforcing stimulus, "Good" delivered in a neutral tone, and a specific nonverbal reinforcing stimulus, a combination of a smile and affirmative nod, in the conditioning of word preferences. Two hypotheses were proposed: (1) the nonverbal reinforcing stimulus will be more effective than the verbal reinforcing stimulus in bringing about verbal conditioning, and (2) the nonverbally reinforced group will show more awareness and a more positive attitude than the verbally reinforced group.

The study was conducted in two phases. The first phase consisted of the development of a word list which was expanded to sets of words composed of the stimulus words and four choice words each representative of four type-of-response categories. Two pilot studies were undertaken the results of which permitted the selection of 120 sets of words: a stimulus word and four choice words representing rhyme, sequential, opposite, and unrelated type-of-response

categories; and the selection of the opposite category as the category appropriate for the conditioning phase of the study.

Eighty-four undergraduates were interviewed by four volunteer undergraduate experimenters during the conditioning phase of the study. The subjects were assigned in a counter-balanced order to two experimental groups and a control group. Each experimenter interviewed seven subjects for each of the three groups.

The experimental design was a word preference situation which adapted the multiple-choice factor of the sentence completion situation and structured the possibilities of response as in a test-like situation. The 120 sets of words were individually presented. The first thirty represented the operant block; the remaining ninety were divided into three conditioning blocks. Group I was reinforced with "Good" delivered in a neutral tone; Group II was reinforced by a combined smile and affirmative nod; Group III served as the control.

No experimental evidence was found to support the hypotheses. Both the specific verbal and nonverbal reinforcing stimuli were found effective. The nonverbal reinforcing stimulus was not significantly more effective and did not attain a higher level of significance than the verbal reinforcing stimulus.

There was no significant difference in either awareness or attitude between the verbally and nonverbally reinforced groups.

However, there was evidence that some unidentified variable, perhaps subtle personality factors or differences in prior conditioning history of the stimuli, was in operation. Possibilities for further research in these areas were discussed.

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APPENDIX A

GI GII GIII Date_____

M F

A B C D

Please answer the following questions.

1. What do you think this was all about?

2. What reason did you have for choosing the words that you chose?

3. Did you notice any change in the kind of words that you were choosing?

4. What did you think the experimenter was doing when he (she) said, "Good" (smiled and nodded, said nothing)?

5. Did you think this was

_____a. fun?

_____b. interesting?

_____c. of no particular interest?

_____d. uninteresting?

_____e. stupid?

(When you have completed these questions, please turn to page 2.)

6. What kind of words do you think caused the experimenter to say, "Good" (smile and nod)?

7. If you have any additional comment about your participation in this study, it would be appreciated.

None _____

I would like to say

THANK YOU FOR YOUR COOPERATION!

APPENDIX B

GI GII GIII DATE_____

M F

A B C D

OPTICAL	auditory	famous	illusion	topical
MISTY	carefree	weather	clear	twisty
DISTANT	chimes	insistent	near	brilliant
RECENT	history	decorous	remote	decent
POLITELY	withdrew	hence	contritely	rudely
OMIT	remit	chatter	names	include
EXPECT	inspect	letter	surprise	fasten
COURAGE	inkwell	moorage	displayed	timidity
GLIDER	brick	slider	submarine	path
OPTIMISTIC	gloomy	journalistic	attitude	unique
CONTINUE	dine	retinue	reading	cease
AMUSE	inquire	weary	bemuse	children
OPENLY	brokenly	within	constrainedly	smiled
AFAR	nearby	mar	sedately	ranged
YOUNGSTER	oldster	punster	grew	window
PROFITABLE	hospitable	slippery	discussion	useless
EASILY	laboriously	breezily	meantime	accomplished
AMPLE	insufficient	material	sample	lone
SLOWLY	duly	lowly	fleetly	walked
PARTICLE	elevator	article	floated	aggregate
QUALIFICATION	disqualification	discussed	mollification	basket
WISDOM	necklace	learned	folly	welcome
NEVER	fear	ever	lever	airily
SINCERE	carroty	false	congratulations	appear
OBTAIN	references	give	hear	terrain
DELIGHTFUL	rightful	unpleasant	wide	luncheon
FORGIVE	sing	revenge	mistakes	misgive
SUCCESSFUL	author	unfortunate	oceanic	distressful

EAGER	indifferent	meager	plump	child
PRESENTLY	distantly	depart	leniently	apparently
CLEARLY	visible	nowadays	confusingly	dearly
STRENGTH	weakness	returned	length	clock
NARRATE	withhold	events	carry	aerate
ABILITY	rated	limitation	orange	stability
MODEST	boastful	oddest	wage	middle
RETAIN	forget	whirl	detain	copy
PROVIDE	divide	deplete	hobble	funds
LAWFUL	descriptive	act	unlawful	awful
OBVIOUSLY	heedlessly	enviously	busy	complicatedly
ABLAZE	brightly	amaze	unilluminated	smiling
OPERATE	neglect	cooperate	thaw	machines
DEMOCRATIC	jovial	undemocratic	operatic	approach
MODERATELY	separately	extremely	priced	yonder
POPULAR	singer	unpopular	eastern	jocular
EXPLAIN	procedure	confuse	complain	manufacture
PERCEIVE	overlook	objects	deceive	decorate
GLADLY	assisted	madly	bleakly	orderly
GENTLY	aback	harshly	patently	tapped
IDEA	vacuity	media	bracelet	discussed
RAINDROP	backdrop	wardrobe	dust	fell
PERFORM	neglect	confide	task	reform
CHIVALRY	flowered	rivalry	leaf	impoliteness
VITAMIN	wharf	inorganic	regimen	source
BEGIN	compare	chagrin	race	discontinue
OBEY	today	signals	disobey	sketch
VALLEY	tally	floor	hill	desk
PLEASANT	displeasing	untold	day	present
DECISIVE	indecisive	answer	lively	derisive
LAUGHTER	scowl	echoed	combustion	rafter
NEGOTIATE	knit	associate	disarrange	treaty
HERO	villain	zero	journal	marched
LATELY	stately	eventually	arrived	happily
EFFICIENTLY	arranged	ineffectively	anywhere	sufficiently

CARGO	largo	passenger	aboard	role
CUSTOMER	vendor	misnomer	bought	tablet
QUICKLY	strictly	ran	objectively	slowly
JIFFY	miffy	eternity	dragon	is
KINDNESS	chair	blindness	malice	displayed
MERCY	tersely	pitilessness	trombone	won
USUALLY	wear	lavishly	infrequently	casually
BELIEVE	relieve	disbelieve	it	write
INDUSTRY	inactivity	blustery	seems	cameo
LOUDLY	soundlessly	aptly	roared	proudly
LOSE	gloves	gain	dwell	choose
SOLVE	equation	tangle	absolve	carry
INSTRUCTOR	lectured	pupil	conductor	helmet
MOBILIZE	disarrange	see	energies	stabilize
ADMIRABLE	untirable	unworthy	gesture	dry
ACTIVITY	avidity	idleness	unit	mitten
SUCCESS	failure	planet	requires	recess
SIMPLY	hungry	beyond	pretentiously	dimply
NATURALLY	affectedly	laterally	daily	cheered
MINGLE	divide	recite	colors	tingle
OUTGROWTH	undergrowth	beginning	banjo	was
ACQUIRE	experience	lose	inquire	differ
SEEK	declare	meek	attain	solutions
MELODIOUS	odious	sound	discordant	aloof
TRUTH	scenery	remains	falsehood	booth
HEIRLOOM	chair	gloom	magnet	trinket
HAPPINESS	misery	reigned	sappiness	anvil
NOBLY	done	ignobly	nearby	soberly
INFORM	committee	decorate	withhold	conform
LIKEWISE	dramatically	pleased	dissimilarly	lengthwise
LOCATE	books	placate	spin	displace
READILY	doubly	grudgingly	steadily	available
REALLY	raced	ideally	doubtfully	before
BEAST	grazed	medal	invertebrate	yeast
NOTEWORTHY	article	docile	trustworthy	ordinary

PURELY	surely	elsewhere	composed	collectively
FORMERLY	audibly	normally	known	hereafter
MAINTAIN	oppose	sustain	pressure	sweep
TELEVISION	cadence	revision	developed	telegraph
FINALLY	keenly	tinily	initially	answered
UNIVERSE	intersperse	penny	vacuum	is
KNOLL	flatland	appeared	goal	yacht
THEORY	fact	query	discussed	biscuit
GRADUALLY	rapidly	truly	factually	advanced
GROW	pose	tall	throw	wither
INSIST	sweep	consist	in	discontinue
OUTLYING	threadbare	replying	inner	areas
NUMEROUS	styles	affable	humorous	few
FAIRLY	unjustly	hourly	determined	barely
ORIGIN	is	violin	termination	balloon
SUDDENLY	leisurely	barked	woodenly	boastfully
FACT	illustrated	language	tact	rumor
BUSILY	talked	frizzily	only	lazily
HEALTHY	plant	lofty	wealthy	sickly
HUMANE	joyous	remain	action	unkind
DESCRIBE	sights	inscribe	mend	understate
CLOSELY	bashfully	follow	mostly	leniently

APPENDIX C

TALLY OF THE RESPONSES FOR THE OPPOSITE CATEGORY FOR GROUP I

Experimenter	Subject Sex and number[1]	Blocks 1	2	3	4
A male	F-1	16	18	17	17
	F-2	9	17	27	22
	M-3	5	1	8	5
	M-4	9	13	18	15
	F-5	15	12	16	15
	M-6	1	0	2	7
	F-7	28	28	30	29
B female	M-1	7	8	12	7
	F-2	11	12	16	19
	M-3	20	21	25	28
	M-4	15	16	13	18
	F-5	19	7	13	11
	F-6	19	20	18	12
	M-7	17	22	18	25
C female	F-1	13	13	15	10
	M-2	7	6	5	6
	F-3	16	21	24	22
	M-4	14	10	14	10
	M-5	13	10	11	7
	F-6	25	24	27	27
	F-7	18	22	27	26
D male	F-1	15	19	25	26
	F-2	12	11	12	16
	F-3	13	7	16	15
	F-4	12	10	7	11
	M-5	12	15	16	16
	M-6	4	5	16	19
	M-7	6	6	4	2

[1]Number refers to the order in which the subject was interviewed by the experimenter.

TALLY OF THE RESPONSES FOR THE OPPOSITE CATEGORY FOR GROUP II

Experimenter	Subject Sex and number[1]	Blocks 1	2	3	4
A male	F-1	20	22	20	21
	M-2	9	6	11	10
	M-3	14	10	14	13
	M-4	18	19	26	26
	F-5	10	10	18	18
	F-6	15	17	15	21
	M-7	10	14	11	13
B female	M-1	5	10	12	9
	F-2	9	4	3	4
	F-3	22	17	20	20
	F-4	8	20	24	23
	F-5	18	13	28	27
	M-6	25	24	25	25
	M-7	12	13	16	19
C female	F-1	11	10	11	11
	F-2	16	16	23	15
	M-3	17	11	17	18
	F-4	20	19	17	21
	M-5	11	12	10	7
	F-6	17	16	14	10
	M-7	12	8	5	7
D male	F-1	20	19	24	19
	F-2	13	7	1	4
	M-3	9	8	10	13
	M-4	16	16	7	13
	M-5	18	14	21	19
	M-6	18	10	11	14
	F-7	9	9	8	4

[1]Number refers to the order in which the subject was interviewed by the experimenter.

TALLY OF THE RESPONSES FOR THE OPPOSITE CATEGORY FOR GROUP III

Experimenter	Subject Sex and number[1]	Blocks 1	2	3	4
A male	F-1	8	7	7	3
	F-2	17	12	21	17
	M-3	23	21	24	25
	F-4	10	9	17	14
	M-5	16	7	9	7
	M-6	16	8	9	10
	M-7	16	11	9	7
B female	M-1	14	11	15	8
	M-2	7	5	7	4
	F-3	29	28	30	26
	F-4	16	18	20	22
	M-5	9	8	4	4
	F-6	20	23	20	14
	F-7	4	10	15	16
C female	M-1	16	11	8	7
	M-2	21	18	24	17
	M-3	19	8	15	20
	F-4	8	6	14	6
	M-5	20	16	18	16
	F-6	14	8	13	10
	F-7	25	23	24	21
D male	F-1	22	20	24	24
	F-2	19	12	14	14
	F-3	16	11	16	15
	M-4	12	11	15	11
	M-5	10	8	14	4
	M-6	8	11	11	11
	F-7	17	14	15	11

[1]Number refers to the order in which the subject was interviewed by the experimenter.

APPENDIX D

TALLY OF RESPONSES FOR AWARENESS[1] AND ATTITUDE[2] FOR GROUP I, GROUP II, AND GROUP III

	GROUP I			GROUP II			GROUP III		
Experimenter	S[3]	Aw	Att	S[3]	Aw	Att	S[3]	Aw	Att
A male	F-1	0	0	F-1	1	1	F-1	0	1
	F-2	0	1	M-2	1	1	F-2	0	1
	M-3	0	0	M-3	0	1	M-3	0	1
	M-4	1	1	M-4	1	1	F-4	0	1
	F-5	1	0	F-5	1	1	M-5	0	0
	M-6	0	-1	F-6	1	0	M-6	0	0
	F-7	1	1	M-7	0	1	M-7	0	1
B female	M-1	0	1	M-1	1	1	M-1	0	0
	F-2	1	0	F-2	0	1	M-2	0	0
	M-3	1	0	F-3	1	1	F-3	0	1
	M-4	0	1	F-4	1	1	F-4	0	1
	F-5	1	0	F-5	1	1	M-5	0	1
	F-6	1	1	M-6	0	1	F-6	0	1
	M-7	1	1	M-7	1	1	F-7	0	1
C female	F-1	1	1	F-1	0	1	M-1	0	1
	M-2	1	1	F-2	0	1	M-2	0	1
	F-3	0	1	M-3	1	1	M-3	0	1
	M-4	1	1	F-4	0	1	F-4	0	1
	M-5	1	1	M-5	0	1	M-5	0	0
	F-6	0	1	F-6	1	1	F-6	0	1
	F-7	1	0	M-7	0	1	F-7	0	1
D male	F-1	1	1	F-1	1	1	F-1	0	1
	F-2	1	1	F-2	0	1	F-2	1	1
	F-3	1	1	M-3	1	1	F-3	0	1
	F-4	1	1	M-4	0	1	M-4	0	1
	M-5	0	1	M-5	0	1	M-5	0	1
	M-6	1	1	M-6	0	-1	M-6	0	1
	M-7	0	1	F-7	0	1	F-7	0	1

[1]Awareness was determined by question 6 on the questionnaire.

[2]Attitude was determined by question 5 on the questionnaire.

[3]Subjects are listed by sex and number. Number refers to the order in which the subject was interviewed by the experimenter.