THE EFFECT OF FRUSTRATIVE NONREWARD ON VERBAL PRODUCTIVITY IN AN INTERVIEW SITUATION

by

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

CHAPTER I

INTRODUCTION

That nonreward has motivational properties has been proposed by Amsel (1958). In instrumental behavior, if nonreward occurs when reward is anticipated, an aversive emotional condition, frustration, results and this invigorates ongoing behavior. Amsel theorizes that this invigoration, called Frustration Effect (FE), occurs because frustration contributes to the organism's generalized drive (*D*) level. Animal studies have shown that FE is a function of the development of an anticipatory mechanism (r_R-s_R) which occurs when the organism is rewarded (Amsel, Ernhart, & Galbrecht, 1961; Amsel & Hancock, 1957; Amsel & Roussel, 1952; Roussel, 1952; Yelen, 1969). Investigations of the temporal factors relating to the demonstration of FE have found that the time of duration and occurrence of the effect vary across species (Davenport, Flaherty, & Dryud, 1966; Davenport & Thompson, 1965; MacKinnon & Amsel, 1964; Staddon & Innis, 1966). Also, task complexity has been shown to affect the demonstration of the FE (Schmeck & Bruning, 1968).

The basic paradigm for the elicitation of frustration was developed by Amsel (1958). He trained rats under deprivation conditions to make two serial responses (running down alleys) after which both responses were rewarded. Once the animal's behavior in the alleys stabilized, 50 percent nonreward was introduced on a random basis after the first response. Reward always occurred after the second response. The FE resulting from nonreward was measured by the animal's starting and running speeds in the second alley.

Penny (1960) developed an analog of Amsel's paradigm for use with children. Subjects, not under deprivation conditions, pulled two levers (R1 and R2) serially and were rewarded after each response with marbles. Nonreward was introduced in the test trials and occurred 50 percent of the time after the first response had been completed. Penny found a significant FE manifested in an increase in movement speeds after nonreward. This was replicated by Willard (1971). Other FE variables which have been investigated with children have been intertrial interval (Ryan, 1965; Moffitt & Ryan, 1966), interresponse interval (Watson & Ryan, 1966; Watson, 1970), and the characteristics of the reward (Watson, 1967).

Libb (1970) has extended FE investigations to adult human behavior in a study of the effect of nonreward on the learning of a complex task by college students. Serum

(1972) extended this research including Rotter's (1966) Locus of Control of Reinforcement construct as an important variable affecting the demonstration of FE with human subjects. Continued research on FE with adult humans seems invited.

Previously, the instrumental response used in experimental studies of FE has been some voluntary motor response. However, the "instrumental" verbal response characteristic of human speech seems a feasible choice for investigating the effect of frustration on adult human behavior. The vigor and duration of speech is measurable and has been found to be sensitive to another emotional condition, anxiety (Murray, 1971). Verbal reward has been shown to be effective in verbal conditioning studies (Greenspoon, 1962; Newmark, 1971) and appears appropriate for reinforcing verbal responses.

Thus, investigating the generality of the theory of frustrative nonreward using a paradigm analogous to Amsel's (1958) within the context of a verbal interview situation is the major purpose of this study. While controlling for effects of Locus of Control, a second goal will be to account for the effect of Trait Anxiety levels on speech behavior and to determine possible interactions of the two emotional conditions, anxiety and frustration. Also, the reinforcement properties of verbal reward statements will be examined.

Frustrative Nonreward

Amsel defined frustrative nonreward as nonreward which occurs when an expectancy of reward has been established. The resulting frustration effect is considered an "attribute of primary, unlearned frustration [Amsel, 1969, p. 5]."

Prerequisite to the development of frustration is the establishment of a positive expectancy or anticipation of reward. Using Hull's construct of reward expectancy, r_G-s_G, Amsel has theorized that expectancy develops as a classically conditioned implicit response (r_R-s_R); a part of the consummatory goal response which is pulled forward in time, and produces cues or stimuli relating to interaction with goal object during instrumental goal-approaching behavior. Once expectancy is established by rewarding the instrumental response, the occurrence of nonreward following the instrumental response produces the aversive, motivating emotional condition, frustration. Frustration contributes to the drive level of the organism, and immediately subsequent instrumental responses are invigorated.

In his investigations of frustrative nonreward, Amsel (1958) has employed an experimental paradigm composed of two serially arranged instrumental responses. Using rats as subjects, the basic procedure has been as follows: The apparatus is a tandem runway in which a rat is trained to run down two successive alleys into two successive goal boxes. During training, the animal (under deprivation conditions) is rewarded with food in both goal boxes until the animal's running behavior stabilizes. In the test trials, reward is occasionally omitted in Goal Box 1, but always occurs in Goal Box 2. The drive properties of frustrative nonreward are measured by the animal's decrease in starting speed and increase in running speed in the second alley after nonreward. In the initial study, using this paradigm (Amsel & Roussel, 1952), the occurrence of nonreward in the test trials led to an increase in speed and a decrease in the latency of the second response.

Amsel's research substantiating the motivational properties of nonreward has been carried out primarily with animals performing a simple motor task. Little interest has been expressed in the effects of frustrative nonreward (and increased motivation) on complex tasks wherein the possibility of competing responses exists. Spence (1966) proposed that, with a complex task, anxiety may deter or facilitate the performance of the criterion response depending on the strength and nature of the responses elicited. Thus, increased motivation may facilitate a competing response and consequently weaken the criterion response.

Mowrer (1960) has also noted that frustration

> . . . involves the nonfulfillment, nonconfirmation of an implied "promise" and the emergence . . . of the experience previously termed _disappointment_, . . . the _loss_ of hope and the _return of fear_ . . . [p. 407].

He adds that fear and anger (frustration) are similar physiologically in that both entail the arousal of the sympathetic division of the autonomic nervous system. Arousal may be seen as fear or anger depending in part on the organism's set or "intention." Thus, Mowrer acknowledges that either attack or retreat may be elicited by emotional arousal and facilitated by the subsequent motivational increment. Mowrer's speculations appear congruent with the proposal that, initially, in a complex situation, competing responses may be invigorated by the motivational components of emotionality.

FE Investigations--Animal Subjects

Animal research has dealt mainly with stimulus variables which affect the development of expectancy (Amsel, Ernhart, & Galbrecht, 1961; Amsel & Hancock, 1957; Roussel, 1952; Yelen, 1969) and with the effect of varying the interresponse interval (Davenport & Thompson, 1965; Davenport, Flaherty, & Dryud, 1966; MacKinnon & Amsel, 1964; Stannon & Innis, 1966). Schmeck and Bruning (1969) studied the effect of FE on a complex motor task.

Amsel and Hancock (1957) tested the relationship of r_R of the r_R-s_R mechanism and FE by varying the similarity of Runway 1 and Goal Box 1. The authors reasoned that the group experiencing similar stimuli in the runway and the goal box would develop a stronger r_R-s_R response and thus a greater FE than the group with dissimilar runway and goal box. Their hypothesis was supported as indicated by a significantly greater FE for rats experiencing similar runway and goal box appearances.

Amsel, Ernhart, and Galbrecht (1961) also investigated the relationship of r_R to FE. They hypothesized that the greater the length of Runway 1, the longer the period for developing r_R. They found a greater FE with a longer runway, thus supporting the assumption that the development of r_R-s_R is related to the magnitude of FE.

Roussel (1952) was interested in the percentage of rewarded trials in training required to develop r_R-s_R and FE. Roussel, comparing 100 percent reward training with 50 percent reward training, proposed that 50 percent reward should result in a less immediate development of FE. Her hypothesis was supported in that a gradual development of the FE occurred using 50 percent reward in training after about 20 trials.

The relationship of the number of rewarded trials in training with the development of FE was examined further by Yelen (1969) who varied the number of continuously rewarded trials in training. Rats experienced either 12, 36, or 60 training trials in a tandem runway situation, then were given thirty 50 percent rewarded test trials. Running and starting speeds of the second response showed a significant FE in all groups with the magnitude of the FE significantly larger in the group receiving sixty training trials. The author concludes that, while a small number of training trials (twelve) are sufficient to produce FE, greater amounts of training results in greater FE. He comments that this function is probably not a linear one.

Another area of investigation of FE has been the duration of the interresponse interval (IRI) or delay of the second response. In their initial study, Amsel and Roussel (1952) found no differences in the FE between groups of rats experiencing 10, 20, or 30 seconds delay in Goal Box 1. However, MacKinnon and Amsel (1964) found that a detention in Goal Box 1 of 3 seconds and 15 seconds produced a significant FE, while a detention of 90 seconds did not. They concluded that FE is greatly weakened by a 90-second delay.

Using pigeons as subjects, Staddon and Innis (1966) employed a procedure analogous temporally to Amsel's tandem runway. Analogs to the runways were fixed interval schedules. A time-out period between the two fixed interval schedules corresponded to the delay of the second response. A reliable FE was found using a time out of 3.2 seconds, but not with a time out of 30 seconds.

Davenport and Thompson (1965) demonstrated FE with an IRI of 5 seconds using monkeys as subjects. A second study with monkeys and rats (Davenport, Flaherty, & Dryud, 1966) varied the IRI using 5-, 10-, 20-, and 40-second intervals in a within-subject design. A consistent FE was shown with a 5-second interval. With 10-, 20-, and 40-second intervals, the speed of the second response on nonrewarded trials remained at a level similar to that of 5-second interval trials. However, performance on rewarded trials (in which a delayed second response was also presented) increased, thus reducing the difference between nonrewarded and rewarded trials. To account for this finding, the authors proposed that a second type of FE was generated by delaying the second response on rewarded trials.

Schmeck and Bruning (1968), using rats as subjects, investigated the relationship of motivation and performance on tasks of varying difficulty. They substituted a linear maze for the latter portion of the second straight alley of Amsel's tandem runway. They also varied the percentage of reward following the first response (100%, 50%, or 0%).

Considering Spence's (1958) predictions of the effect of drive on the performance of complex tasks and simple tasks, the authors predicted that increased drive resulting from nonreward should produce increased running speed in the initial portion of the second alley, but would lead to an increased number of errors in the complex portion of the alley. These predictions were substantiated. Also, the 50 percent group responded faster after nonreward than the 0 percent group.

In summary, it appears that with a simple motor task, frustrative nonreward produces FE in rats, monkeys, and pigeons. The magnitude of the FE demonstrated is a function of the number of rewarded trials in training, the stimulus characteristics surrounding the first response and reward, the duration of the first response, and the duration of the interresponse interval. With a complex motor task, frustrative nonreward initially leads to a decrement in performance (more errors); however, with continued trials, an increment in performance after nonreward is noted.

FE Investigations--Child Subjects

Investigations of FE using Amsel's paradigm (1958) and children as subjects have been concerned with the development of reward expectancy and the subsequent FE (Penny, 1960; Willard, 1971), intertrial interval (Ryan, 1965; Moffitt & Ryan, 1966), interresponse interval (Watson & Ryan, 1966; Watson, 1970), and the nature of the reward (Watson, 1967). Investigations of social failure (a phenomenon similar in some respects to nonreward) have shown contrasting effects on children's behavior (Endsley, 1966; Ford, 1963; Haner & Brown, 1955).

Penny (1960) conducted the initial investigation of FE with children as subjects. He was interested in the relationship of the number of continuous rewarded training trials to FE. Penny used a double-lever apparatus analogous to Amsel's double runway situation. Pushing Lever 1 (R1) resulted in either a marble reward (R+) or nonreward (R-). Pulling Lever 2 (R2) always resulted in a marble reward. The FE was measured by the difference of R2 movement speeds following R+ and R- trials. Two stimulus lights elicited R1 and R2. A 10-second IRI was used; however, trials were massed. Between-subject variables were number of rewarded training trials (10 versus 1) and schedule of reward in test trials (50 percent versus 100 percent). Eighteen test trials were conducted. Response speeds reflected an apparent FE in increased movement speed of R2 following nonreward in the group which received 10 rewarded training trials. Ryan (1963) noted that this apparent FE was a result of a decrease of movement speed after rewarded trials rather than an increase of movement speed following nonreward. Other groups showed no significant FE.

Using a similar apparatus and kindergarten children as subjects, Willard (1971) investigated the development of expectancy. He compared the effects of continuous reward (100 percent) versus noncontinuous (50 percent) in training and the effects of delay versus no delay of the first response. The delay of the first response was considered analogous to extending the runway in a previously reviewed animal study (Amsel, Ernhart, & Galbrecht, 1961). He employed a 5-second IRI and a 45-second intertrial interval. The results corroborated the previous finding with rats (Roussel, 1952) in that intermittent reward in training led to a more gradual development of FE as compared to continuous reward. However, no reliable differences in latency or movement speeds were found in the delay-no delay comparison.

Ryan (1965), using an experimental task similar to Penny's (1960), employed a 45-second intertrial interval and a 10-second IRI. Subjects were given two rewarded training trials and twenty test trials. The experimental group received 50 percent reward for R1 in test trials; the control group, 100 percent reward. Starting speeds reflected a weak FE. However, movement speeds did not. This line of investigation was continued by Moffitt and Ryan (1966) who found significant FEs with both starting and movement speeds using an intertrial interval of one day and an interresponse interval of 10 seconds.

Watson and Ryan (1966), using a within-subject design, varied the IRI with kindergarten children as subjects. During 24 test trials, they employed 8 trials with a 5-second IRI; 8, with a 10-second IRI; and 8, with a 20-second IRI. Nonreward occurred 50 percent of the time after the first lever was pulled. Analyses of movement speeds indicated a significant FE with the 5-second IRI, but not with the 10- and 20-second IRI's. Starting speeds reflected similar results with marginal significance. Watson and Ryan concluded that FE in children is substantial and reliable, but somewhat transient. An IRI of 5 seconds appeared to them to be optimal for FE to occur. Watson (1970) re-analyzed these data in terms of individual differences. Profiles of individuals' response patterns at each IRI were intercorrelated to discover clusters of response patterns. Two clusters (_A_ and _B_) were found. Subjects with an _A_ response pattern appeared to show FE with the 5-second IRI, while those with _B_ response patterns demonstrated FE with the 20-second IRI. Sixty percent of the subjects showed _A_ patterns; 27 percent, _B_ patterns. Thus, Watson qualified his previous conclusion about the transience of FE, limiting it to only a certain proportion of subjects.

Continuing to explore these two response patterns, Watson (1970) developed a two-choice task in which subjects picked one of two cards placed face down. Subjects were told to pick the card that they believed was black (or red). They were given one success trial followed by eight frustrative trials wherein it was impossible to make the right choice. The FE was indicated by a shift in response choice. If the card on the right was incorrect, then a shift to the left card on the next trial indicated FE. Watson reasoned that the directive, cue properties of nonreward would lead to a response shift. Subjects ranged in age from 62 months to 160 months. They were chosen from kindergartens and grades 2, 4, and 6. Response profiles for each grade level were intercorrelated. Two basic response patterns were isolated. _A_ response patterns were those in which subjects showed FE (response shift) on the first and third trials after the initial frustrative trial. _B_ response patterns showed FE on the second trial after the initial nonrewarded trial. _A_ patterns were most prevalent among the younger subjects, while _B_ patterns occurred more often in the older subjects. Since the second trial occurred 16-20 seconds after the first frustrative trial, Watson proposed that these two patterns of response are similar to the short-latency and long-latency responses of the earlier study (Watson & Ryan, 1966). He concluded that there were two response patterns to nonreward: short-latency responses characteristic of younger children, and long-latency responses characteristic of older children. It should be noted that the concept of FE as a response shift is a product of the cue function of nonreward, rather than the drive properties. Also, the latency of the FE is not the same as the starting speed of previously reviewed studies of FE. There was no measure of reaction time in Watson's series of studies.

Using the second graders of the previous experiment, Watson (1970) manipulated the subjects' expectancy of success by instruction set. He found that subjects who formed a low success expectancy yielded only the short-latency reaction to frustration. Subjects forming a high success expectancy produced both long and short-latency response patterns. Watson's findings suggest that the use of an instrumental response of at least 20 seconds duration would allow individual reactions to nonreward to occur.

Most of the previously reviewed children studies have rewarded with marbles which could be exchanged for toys. Watson (1967) compared the use of candy and social reward in producing FE. Kindergarten children performed a series of lever pulling trials for 50 percent and 100 percent reward. Social reward was the verbalization, "Good." The response speeds of the 50 percent group increased relative to those of the 100 percent group without correlation with the type of reward. Nonattainment of both rewards proved sufficient to elicit an apparent FE.

Ryan and Watson (1968), in their review of frustrative nonreward theory and children's behavior, noted that social failure is similar to frustrative nonreward. Both events represent an interference with goal behavior and lead to an emotional response. They reviewed studies in which a thwarting effect occurred after a first response and its effect on a second response measured. Haner and Brown (1955) asked elementary school children to fill a 36-hole marble board with marbles to earn a prize. At varying distances from task completion, the experimenter released the marbles and thus interfered with goal behavior. Subjects pushed a plunger to turn off a buzzer which sounded when the marbles were released. Pressure of plunger pushing was positively related to the nearness of task completion. Response latency was not measured. In contrast, Ford (1963) and Endsley (1966) found response decrements when subjects' goal behavior was thwarted. Ryan and Watson (1968) proposed two possible explanations for this response decrement. They suggested that nonreward and social failure may produce qualitatively different responses. Also, since these last two studies employed only 8-16 trials, they proposed that the response decrement represented an initial reaction to failure. With continued trials, response increment might occur. An alternate hypothesis proposed by Ford suggested that subjects may differ in their perception of failure. In his study, subjects may have viewed failure as their fault and this self-blame may have led to more competing responses than other-blame.

In summary, it seems that FE has been reliably demonstrated using children as subjects. As in the animal studies, a number of rewarded training trials presented either in a continuous or noncontinuous schedule is required for reward expectancy to develop. In one case, two rewarded training trials proved sufficient to produce FE (Ryan, 1965). Other conditions favorable to the elicitation and the measurement of FE are an IRI of 5 seconds with an R2 of at least 20 seconds duration and an intertrial interval of 45 seconds or more. Rewards which have been used successfully are: (a) marbles which can be exchanged for toys, (b) candy, and (c) social reward.

Locus of Control and Expectancy

The Locus of Control (LOC) of reinforcement construct evolved from Rotter's (1954) social learning theory. In general, the control construct is considered to be a generalized expectancy relating to an individual's perception of his power over what happens to him. A person with internal control perceives positive and negative events as a consequence of his own actions. External control implies that a person views these events as unrelated to his behavior and beyond his control. Rotter (1966) developed a questionnaire to differentiate people with regard to the LOC construct. As reward expectancy is an important construct in Amsel's (1958) theory of frustrative nonreward, the LOC variable may prove valuable in FE investigations with human subjects. Research dealing with the construct of expectancy have varied subject variables (internal versus external LOC) and instructional set (skill versus chance).

Butterfield (1964) correlated scores on LOC, frustration, and anxiety questionnaires and found that as LOC scores become more external, frustration reactions become less constructive and more intropunitive and debilitating anxiety reactions scores increase.

Phares (1957) noted that subjects given skill instructions varied their expectancies more frequently and more in the direction of past performance than subjects given chance instructions. A similar instructional manipulation (Holden & Rotter, 1962; James & Rotter, 1958; Rotter, Liverant, & Crowne, 1961) significantly affected subjects' resistance to extinction under partial and continuous training. The superiority of partial reinforcement on the subjects' resistance to extinction was noted only with subjects given chance instructions. The reverse was true with the subjects given skill instructions. Also, skill groups verbalized higher expectancies than chance groups (Rotter, Liverant, & Crowne, 1961).

The explicitness of instructions has also differentially affected subjects (Lefcourt, 1967). When instructions were varied in the amount of explanation regarding the reinforcement contingency, the subjects with internal control scores did not respond significantly to instructions. However, External subjects responded more similarly to Internal subjects as instructions became more explicit. With ambiguous directions, Internal subjects viewed tasks as skill controlled and External subjects saw the tasks as chance controlled (Ude & Vobler, 1969).

In summary, how a person perceives his expectancy to succeed or fail on a given task may be a function of the instructional set, the stated LOC, and their interaction. That subjects given skill instructions show a greater resistance to extinction with continuous training than with partial training is indeed interesting. Amsel's (1958) theory of frustrative nonreward and partial reinforcement proposes that the association of the implicit anticipatory frustrative responses with goal behavior is the key factor in producing greater resistance to extinction with partial reinforcement. Perhaps, subjects given skill instructions do not make this association. These subjects may produce more competing responses when nonrewarded and thus the fractional anticipatory response does not become associated with the goal behavior. This reasoning is similar to that of Ford (1963). Thus, reactions to frustrative nonreward of subjects given skill instructions or subjects with internal LOC scores may be competitive with goal-directed behavior.

FE Investigations--Adult Human Subjects

Using college students as subjects, Libb (1970) investigated the effects of frustrative nonreward on responses to a complex learning task. Results were similar to those found by Schmeck and Bruning (1968) using rats. Initially, subjects made more errors following nonreward than following reward. However, in later stages of learning, fewer errors were made following nonreward than following reward.

In an extended replication of Libb's (1970) study, Serum (1972) incorporated the LOC construct. She predicted that Internal subjects would develop a greater expectancy of reward (Rotter, Liverant, & Crowne, 1961) and thus would respond more strongly to nonreward than External subjects. Using a simple button-press as the first response and a complex learning task as the second response, Serum found that Internal subjects responded significantly faster on nonrewarded trials than on rewarded trials. Also, following nonreward, Internal subjects initially exhibited increased errors, but in later stages of learning, exhibited fewer errors. No significant FE's were shown with errors or latency of the External subjects.

Thus, with adult humans, task complexity, instructional set, and LOC appear to influence behavior following frustrative nonreward.

Speech Rates

In verbal behavior, speech rate is a behavioral measure which corresponds to speed of movement in a motor task and thus may reflect the vigor of verbal behavior. Speech rate has been used as a dependent variable in previous research relating the emotional condition, anxiety, to speech behavior (Murray, 1971). Goldman-Eisler (1956), Martin (1955), and Webb (1967) have delineated two types of speech rates, Phonation Rate and Verbal Rate. Phonation Rate, or Articulation Rate, has been defined as the speed of producing speech and is determined by dividing the number of syllables by the time required to speak them. Verbal Rate, on the other hand, takes pause time into consideration. It is determined by dividing the number of syllables by the sum of the speaking time and the pause time. A variant of this measure is employed when words per unit of time are counted. Phonation Rate, then, is a measure of the speed of physical production of speech, while Verbal Rate is more a measure of the quantity of speech for an unit of time.

Probably due to the difficulty of measuring Phonation Rate, it has not been used extensively as a dependent variable. Goldman-Eisler (1956) compared the variability of Verbal Rate, Phonation Rate and pause times and concluded that Phonation Rate was generally invariant within and across individuals. However, Webb (1967) has pointed out an error in her computation which led him to question the invariance of Phonation Rate. Webb (1967), in an investigation of the effect of interviewer speech rates on interviewee speech rates in a standardized audio tape recorded interview, found Phonation Rate to be more sensitive to these effects than Verbal Rate. In a similar study using a standardized video tape recorded interview, Allen (1971) failed to replicate this finding.

Verbal Rate has been used frequently as a dependent variable, especially in interview type situations. Goldman-Eisler (1954a; 1954b) found Verbal Rate to be consistent within individuals, but also sensitive to varying conversational partners. She attributed the variation of Verbal Rate to variability in pause times rather than to actual speech production (Goldman-Eisler, 1956).

Phonation Rate is examined in the present study because this rate should reflect changes in the rate of speech production in very short utterances more strongly than an overall measure such as Verbal Rate. With Verbal Rate, small differences in rate change could be diluted by pause times.

Verbal Productivity and Anxiety

Of particular relevance to the present investigation is the effect of emotionality on verbal productivity. Much research has been concerned with the effect of anxiety on speech behavior. Two different anxiety factors, State and Trait, have been isolated by Cattell and Scheier (1958, 1961) by factor analysis. The Trait factor refers to a "unitary, relatively permanent personality characteristic [Speilberger, 1966, p. 13]" while the State factor refers to a "transitory state or condition of the organism which fluctuates over time [Speilberger, 1966, p. 13]." Speilberger, Corsuch and Lushene (1969) developed the State-Trait Anxiety Inventory (STAI) for the purpose of measuring these two factors. State Anxiety as delineated by their scale is

> . . . a transitory emotional state or condition . . . characterized by subjective, consciously perceived feelings of tension and apprehension, and heightened autonomic nervous system activity [Speilberger, *et al.*, 1969, p. 2].

Trait Anxiety is described as the "tendency to respond to situations perceived as threatening with elevations in A-state intensity [Speilberger, *et al.*, 1969, p. 2]." Reliability and validity data on the STAI are provided in the aforementioned reference.

Spence (1958; 1964) has also shown interest in anxiety and its behavioral effects. He investigated the motivational properties of anxiety in simple and complex learning situations. In order to select subjects who varied in their emotional responsiveness, Spence employed the Taylor Manifest Anxiety Scale (MAS) (Taylor, 1953). This scale has been shown to correlate .85 with the Trait Scale of the STAI (Cattell & Scheier, 1961). Initially, Spence (1958) proposed that the emotional response, anxiety (as measured by the MAS), contributed to the organism's generalized drive in learning situations resulting in enhanced performance. With classical conditioning of the eye-lid reflex, Spence (1964) found ample evidence to support a positive relationship between MAS scores and performance level. However, with more complex learning situations, the motivational effect of anxiety were not so clear cut. Spence (1966) proposed that, since there is a greater possibility of competing responses in complex tasks, the strength of competing responses is a factor in predicting anxiety effects. In addition to enhancing generalized drive, Spence adds that stimulus eliciting components of anxiety may either facilitate or deter performance, depending on the nature and strength of the elicited competing response. Another theory proposes that there may be a nonmonotonic relationship between anxiety and behavior (Murray, 1971). However, Spence (1966) maintains that research with anxiety is still at an early stage and that considerably more research will be needed to effectively delineate anxiety's behavioral role.

Of importance to this study are the effects of the two anxiety factors, State and Trait, on non-content measures of verbal behavior. Murray (1971), in a review of anxiety and speech, noted that investigators usually employ one or more of three verbal productivity measures--quantity, rate, and silence. In his review, Murray found that, of 40 studies of anxiety and speech quantity, 30 percent showed a significant positive relationship, 36 percent, a significant negative relationship, and 34 percent, nonsignificant relationships. Of 25 studies of anxiety and silence (latency and pauses), 32 percent reported a significant positive relationship, 24 percent, a significant negative relationship, and 44 percent, nonsignificant relationships. In a comparison of 19 studies dealing with anxiety and speech rate (Verbal Rate), 37 percent indicated a significant positive relationship, 21 percent, a significant negative relationship, and 42 percent, a nonsignificant relationship. With such a wide discrepancy in the findings, methodological and conceptual issues should be considered before conclusions are drawn. Only the most relevant studies will be reviewed in this paper.

In studies of State Anxiety, stress in the experimental situation is usually manipulated. One context wherein stress was manipulated is speaking before an audience. Studies varying the actual or apparent size of the audience have produced divergent results. Levin, Baldwin, Gallway, and Paivo (1960) compared the verbal response of 10-12 year olds before an audience of one adult or seven adults. Each subject was asked to tell a story. The results indicated shorter stories were told before the larger and seemingly more stressful audience. The audience did not respond to the subjects' stories. No measure of State Anxiety was employed. Contrasting results were found in an experiment by Sauer and Marcuse (1957) who compared the effect of overt and covert tape recordings of subjects telling TAT stories. The subjects were also divided into high and low anxiety groups by their scores on the MAS. There were no significant differences between anxiety groups. However, the subjects in the high anxious group who were overtly recorded showed a significantly higher word count, shorter latency, and faster word rate. Low anxious subjects showed similar trends. The authors conjectured that the use of overt recording was the more stressful of the two conditions. Confounding, however, may have occurred when subjects, who did not realize they were being recorded, slowed their speech to allow the experimenter to transcribe their stories.

Another manipulation in speech making situations varied the approval or disapproval of the audience. Cervin (1956) found that subjects who received disapproval spoke a significantly smaller proportion of the time and with longer latencies. A series of studies (Miller, Zavos, Vlandis, & Rosenbaum, 1961; Miller, 1964; Vlandis, 1964) also investigated the effect of approval on speech. The general experimental procedure required male undergraduate students to make a short speech following a speech made by a confederate. Both the experimenter's response to the confederate and to the subject were varied. The initial study (Miller, *et al.*, 1961) found that subjects who experienced less approval than the confederate spoke slightly less. Miller (1964) found that subjects who received disapproval after the confederate received approval spoke significantly less than those receiving the same treatment as the confederate. Vlandis (1964) used a within-subject variant of the previously described method. Rather than vary approval from the confederate to the subject, the subject received approval for one part of his speech and disapproval for the other. Order of conditions were counterbalanced. He found that subjects going from more to less favorable experimenter responses produced significantly less speech, while those who received the same response or from less to more favorable responses showed nonsignificant increases.

In these studies, disapproval was seen as stressful and thus capable of arousing anxiety. Assuming this is so, in general, stress situations led to a decrease in speech quantity. However, once again, no measures of anxiety were made in the experimental situation. It is possible that disapproval was merely serving as a punisher and thus suppressing the verbal response.

Another method of arousing anxiety was to employ stressful topics in interview situations. In a study by Kanfer (1959), college students were given five topics on which to speak for three minutes each. Content of the monologues was judged for adjustment regarding the topic. He found a significant tendency for subjects to talk faster on topics wherein the content suggested poorer adjustment. Kanfer (1960) obtained a similar result interviewing psychiatric patients on four different topics. The highest verbal rate was found when the subjects were asked to talk about their illness. An external criterion of eyeblink rate substantiated the topic of illness as anxiety producing. It should be noted that, in both these studies, subject related criteria were obtained for determining stress.

Siegman and Pope (1965a) found Articulation Rate to be positively related to anxiety arousing topics. However, this finding was not replicated in later studies (Pope & Siegman, 1967; Siegman & Pope, 1965b). In another study (Siegman & Pope, 1966), the silence quotient was found to be shorter when anxiety arousing topics were being discussed, although verbal productivity did not vary significantly with topical focus. They concluded that varying topical focus may not be an effective manipulation of State Anxiety. In general, a topic which is known to be anxiety arousing by external criteria appears to influence speech rate. However, arbitrary manipulation of topics may prove ineffectual in producing anxiety.

Some investigators have chosen to induce stress in an interview situation by varying the "warmth" of the interviewer. In five studies (Drennan & Wiggins, 1964; Reece, 1964; Reece & Whitman, 1962; Pope & Siegman, 1968), those subjects interviewed by "cold" or supposedly "cold" interviewers produced less speech. Since these interviewers dispensed little encouragement and were sometimes critical, it is possible that the subjects' responses were being extinguished or punished.

In summary, when stress is introduced in the form of aversive stimulation (disapproval and "cold" interviewers), less speech is produced. When stressful topics are used in an environment conducive to speech, verbal quantity and rate increase. It should be noted that, in most studies, anxiety arousal is presumed and not measured.

Investigators have studied Trait or Dispositional Anxiety by selecting subjects according to scores on the MAS or some other measure of emotional responsiveness. Benton, Hartman, and Sarason (1955) found that subjects with higher MAS scores used more words, with a shorter latency, and a faster rate. Cervin (1956) manipulated subjects' Trait Anxiety and stress. The subjects talked to confederates who either disagreed with them (High Stress) or agreed with them (Low Stress). He found that subjects with high MAS scores talked more and with shorter latencies than those scoring low on the MAS in both stress conditions. Siegman and Pope (1965b) correlated speech measures with MAS scores. Subjects' MAS scores correlated .31 (p <.05) with number of words used. Nonsignificant correlations were obtained for reaction times and silence quotients. Eisenman (1966) compared speech characteristics of neuropsychiatric inpatients in three psychotherapy groups during five consecutive therapy meetings. He used three measures of anxiety to dichotimize the patients. He found that high anxious subjects spent more time speaking than low anxious subjects. This finding was replicated with three new therapy groups. A similar finding has been reported by Cervin (1957) who compared the verbal responses of 60 pairs of subjects. Thirty pairs had equal scores on the E scale, a scale of emotional responsiveness. The other 30 pairs of subjects has opposing scores on the E scale. They were given topics on which they disagreed. Those with higher E scores spoke for a longer period of time with significantly shorter latencies.

In summary, people who score high on the MAS (basically a measure of Trait Anxiety), or some other scale of emotional responsiveness, produce more speech with shorter latencies, and in some cases, with faster rates. People who are required to speak under varying conditions of stress (supposedly inducing State Anxiety) express differing reactions. When stress is induced by aversive means, verbal quantity decreases. When stressful topics are used in an environment conducive to speech, verbal productivity and rate increase. Murray (1971) concluded that anxiety, both State and Trait, are probably positively related to verbal quantity and rate.

Verbal Reward

Comparing human verbal and animal conditioning, Kanfer (1968) reviews some of the problems inherent in conditioning with humans. Quite pertinent are his comments concerning human self-regulation and the availability and effectiveness of reinforcers.

On self-regulation, Kanfer (1968) states that subjects "may provide feedback about their own behavior in the absence of external feedback and that these responses tend to maintain their performances [p. 268]." Assuming that self-regulation is developed from past interactions with the environment, it seems that the experimenter can only offset these tendencies of self-regulation by maximizing his treatments and accounting for behavioral sets in hopes of minimizing behavioral variability.

The uncontrolled history of the human being also presents proplems for selecting reinforcers. The potency of reinforcement (primary) is relatively insured with animals by the use of deprivation. Generally, this procedure is not feasible with human subjects. Kanfer (1968) acknowledges this problem and recommends the "independent verification of the effectiveness of the reinforcer and its motivational and informational properties prior to its utilization in an experiment [p. 267]." He adds that this verification is particularly difficult with verbal reinforcers because of the incorporation of both motivational and informational aspects in verbal responses. However, he suggests the categorization of verbal stimuli in terms of "their functional consequences and the conditions under which they are effective [Kanfer, 1968, p. 267]."

Greenspoon (1962) in a review of verbal conditioning presented convincing evidence of the reward value of verbal approval. In an attempt to study verbal behavior of college students within the context of operant conditioning, Greenspoon (1955) obtained an increase in the desired verbal response class using as reward the sound "mmm-hmmm." Similar results were noted with the use of the verbalization "Good" (Cohen, Kalish, Thurston, & Cohen, 1954; Salzinger & Pisoni, 1958; 1960; Wilson & Verplanck, 1956).

A factor which seems to affect the value of social reward is the interaction with the experimenter prior to the experimental session. Solley and Long (1958) noted that verbal conditioning with verbal reward was facilitated by engaging the subjects in conversation prior to the experiment. A similar finding was reported by Kanfer and Karas (1959).

Another factor affecting verbal conditioning is ego-orienting instructions. Hall (1958) found that subjects who were given ego-orienting instructions increased significantly the number of reinforced responses relative to the performance of the subjects who were given task-oriented instructions or none at all.

Of particular relevance to the present investigation is a study by Rosenblum (1959) in which it was noted that verbal reward was effective in producing conditioning regardless of the location of the experimenter. Conditioning occurred when the experimenter was present in the room with the subject and also when he presented the verbal reward from another room.

In an interview situation, Ball (1953) noted that the sound "mmm-hmmm" appeared more effective than the verbalization "huh-uh" for increasing the response class in question. Contradicting this, Hildum and Brown (1956) found that the verbal stimulus "good" was an effective reward, but the sound "mmm-hmmm" was not.

Newmark (1971) developed a library of 23 interviewer utterances which he empirically validated as potentially reinforcing. Three college students experienced a standardized video-tape interview incorporating 27 utterances rated as potentially highly reinforcing by three faculty members from the University Psychology Department. The frequency of responses to each statement was compared resulting in 23 utterances of apparently equal reinforcement potential. Using these utterances, Newmark obtained verbal conditioning with subjects possessing low State Anxiety.

Spielberger and Levin (1962) have indicated that another factor, awareness, plays an important role in verbal conditioning. They noted that what is learned in a verbal discrimination task is the mediation of the contingent relationship manifested by self-reports of awareness. It is this awareness which directs the subject to make the correct verbal response. Should learning not take place, rather than seek explanation in terms of external stimuli (i.e., reinforcement), the authors might search for evidence of lack of awareness on the subject's part. Kanfer (1968) responded to their hypothesis by commenting that merely postulating awareness or lack of awareness does not fully explain the situation. He proposes that mediation is subject to the same principles of behavior as the overt response. Thus functional relationships exist between the development of awareness and external events.

Despite some contradictory findings, it seems well-founded that verbal stimuli can serve as rewards or reinforcers of behavior. Greenspoon (1962) speculated that much of the behavior of adult humans is under the control of such verbal stimuli.

CHAPTER II

STATEMENT OF THE PROBLEM

Amsel's (1958) theory of frustrative nonreward proposes that nonreward, occurring when reward is expected, results in increases motivation and facilitates the performance of an instrumental response. Most investigations with animals and children have employed the paradigm Amsel adapted to the instrumental behavior in question. The basic paradigm is composed of two serially arranged instrumental responses each followed by the opportunity for reward or nonreward to occur. Generally, in training, the organism is rewarded 100 percent of the time to develop the expectancy of reward. In test trials, noncontinuous reward occurs after the first response and continuous reward, after the second response. The Frustration Effect (FE) is measured by the movement and starting speeds of the response following nonreward (second response).

In studies demonstrating FE in children, the conditions sufficient for FE to occur have been of the greatest concern (Ryan & Watson, 1968). As in animal studies, a number of rewarded training trials are required for reward expectancy to develop. The smallest number of training trials found effective to produce FE was two (Ryan, 1965). Other conditions favorable to the elicitation of FE are an interresponse interval of 5 seconds (Watson, 1970; Watson & Ryan, 1966; Willard, 1971) and a second response of sufficient duration for FE to occur (Watson, 1970). A minimal intertrial interval of 45 seconds or more has been favored to permit FE to dissipate between trials (Moffitt & Ryan, 1966; Ryan, 1965; Willard, 1971). Social reward, candy, and marbles exchangeable for toys have been shown to be effective rewards (Ryan & Watson, 1968). FE research with adult humans has shown that task complexity (Libb, 1970; Serum, 1972) influences the occurrence of FE. With a complex learning task, frustrative nonreward initially results in a response decrement (more errors). Also, Serum (1972) found that FE could be demonstrated only with subjects possessing internally oriented LOC of reinforcement.

Further generalization of the effect of frustrative nonreward to human adults is clearly invited. And the human verbal response seems to possess the qualities necessary to demonstrate FE with adult humans. Two speech rates, Phonation Rate and Verbal Rate, which measure articulation rate and speech quantity within a given unit of time respectively, are verbal variables which seem well suited to the measurement of increased response vigor due to frustration. Latency of verbal responses corresponds to the starting speeds of other instrumental behaviors. Also, speech rate and quantity have been shown to be sensitive to other emotional effects such as anxiety (Murray, 1971). This fact must be considered carefully when a verbal response is a dependent variable, since the effect of anxiety may contaminate the effect of frustration.

Much of the research studying the verbal response has employed an interview situation (Greenspoon, 1962; Murray, 1971). Considering the discrete-trial procedure used by Amsel (1958), one way to incorporate this procedure within an interview situation would be to use different discussion topics for each trial. Verbal reward (Greenspoon, 1962; Newmark, 1971) presented by the interviewer would complete the structure of the experimental situation.

It has been shown that standardized prerecorded interviews on audio tape have been effective in eliciting verbal responses in college students (Webb, 1967) and also provide for the standardization of experimental procedures.

Within the context of an audio tape recorded interview, it was the purpose of the present study to demonstrate the effects of frustrative nonreward in college students using the verbal response as the instrumental behavior and verbal reward statements as reinforcement with the LOC of reinforcement controlled. Another purpose was to account for the effects of anxiety on speech behavior and to examine possible interactions of anxiety and frustration. A third purpose was to assess further the reward statement as a reinforcer.

It was predicted that Ss experiencing frustrative nonreward would speak faster (higher Phonation Rate) and yield a greater volume of speech (higher Verbal Rate) than Ss not experiencing frustrative nonreward. No prediction was made concerning the effect of frustrative nonreward on Latency of the second response because of the complexity of the experimental task.

Another prediction was that Ss with high Trait Anxiety scores would speak faster and yield more verbal output than those with low Trait Anxiety scores. No prediction was made regarding the interaction of anxiety and frustration.

It was also predicted that Ss receiving verbal reward statements after their verbal responses would produce more speech than Ss experiencing no verbal reward statements following their verbal responses.

CHAPTER III

METHOD

Subjects

Ninety-six students (51 males and 45 females), aged 17-25 years, were chosen as Ss from introductory psychology, sociology, and political science classes. The criteria for inclusion were scores on the Trait Scale of the STAI and scores on Rotter's (1966) LOC Scale. Only Ss scoring below the class medians (and in the internal LOC range) of the LOC Scale were considered. Half of the Ss were chosen from those students scoring in the upper 20 percent on the Trait Scale. The other half were chosen from the Ss scoring in the lower 20 percent on the Trait Scale. An attempt was made to equate the number of males and females in each group.

Apparatus

The Ss were interviewed in a dimly-lighted interview room adjoining an observation room. A microphone, placed around the S's neck, was connected to a reel-to-reel audio tape recorder in the observation room. The prerecorded interviews were played on a cassette audio tape recorder and presented to S via a speaker located in the interview room. A yellow light was placed on the speaker in front of the S.

The interviews consisted of 20 topics and a library of nondirective reward statements adapted from interviewer statements copywrited by Newmark (1971) and used with his permission (see Appendix A).

To identify topics interesting to college students, a paired-comparison questionnaire (see Appendix B) composed of 86 pairs of 26 topics were given twice to 177 students enrolled in an introductory psychology class. The administrations were given two weeks apart. The 26 topics were ranked according to the mean proportion of choices given to each topic (Guilford, 1954). The 20 most preferred topics were chosen to be used in the interview. Test-retest reliability coefficients (based on rank-order correlations) were .97 for all students as a groups; .97 for the male student group; and .95 for the female group.

The topics were initially arranged in a random sequence for the interview (Order A). A second order of topics (Order B) was determined by interchanging each pair of topics beginning with the fifth topic (i.e., Topics 5 and 6, 7 and 8, and etc. were interchanged in sequence). This counterbalancing was done in an effort to prevent possible topical influences from interfering with the effects of frustrative nonreward in the experimental groups. For example, because the order of R+ and R- trials remained the same, "Presidential election, 1972" (Topic 5 of the A order and Topic 6 for the B order) occurred in both rewarded and nonrewarded trials in the interviews for the experimental groups.

Each trial consisted of one topic, two 28-second response periods followed either by reward or nonreward, a 5-second interresponse interval, and a 45-second inter-trial interval. This temporal schedule was incorporated in the audio taped interview. A door bell and a door buzzer, which served as audio stimuli, were also incorporated in the taped interviews.

An audio tape recording of each _S_'s interview was made. The second response of each trial was transcribed verbatim and the syllables counted. Two temporal measurements, speaking time and latency, were determined by playing back the interview into a voice-operated relay which activated an electric timer. The durations of each sound and each latency was measured in tenths of a second.

Experimental Design

The _Ss_ (N = 96) were divided into six groups of 16 each. The between-subject variables were Trait Anxiety (High versus Low) and the Treatment Groups (Experimental, C-100, and C-0). The High Anxious _Ss_ were those scoring in the upper 20 percent on the Trait Scale of the STAI (a score of 45 or more), while the Low Anxious Ss were those scoring in the lower 20 percent of the Trait Scale (a score of 30 or less). These two groups were randomly divided further into the Experimental, C-100 and C-0 groups.

Those Ss in the Experimental Group received 50 percent reward following R1 in the 16 test trials. The C-100 Ss received 100 percent reward following R1 (all 20 trials). Both the Experimental and C-100 Ss received 100 percent reward after R2. The C-100 Group was employed as a control for the development of FE. Since these Ss always received verbal reward following R1 and R2, no FE should develop. The C-0 Group received no verbal reward after either R1 or R2. This group served to index verbal reward. Since this group received no verbal reward for talking, these Ss should verbalize less than those in the C-100 Group.

The within-subject variable was Type of Trial (rewarded versus nonrewarded). Although the C-100 Ss received only one type of trial (rewarded), trials yoked to the rewarded (R+) and nonrewarded (R-) trials of the Experimental Group were designated R+ and R- for comparative purposes. This yoked trial procedure was not used in the data analysis of the C-0 Group because this group was not employed as a control for FE development.

The dependent variables were Phonation Rate, Verbal Rate, and Latency of R2.

Procedure

Each _S_ was seated in the interview room, given the State Scale of the STAI, and then handed the following instructions to read:

> I am interesting in hearing you talk. So that you will have something to talk about, you will be given different topics to talk about. You will have two opportunities to talk about each topic. Just say anything you wish about the topic. I will tell you the topics from the other room via the loud speaker. The yellow light in front of you is your signal to talk. Begin talking when it comes on and stop talking when it goes off. Resume talking again when it comes on again. Remember to watch the yellow light. I will be listening to you in an adjacent room.

The experimenter answered any questions the _S_s asked by repeating the instructions, and then left the room. The overhead light in the interview room was dimmed. The topics and reward statements were presented to _S_s via the speaker.

The interview consisted of 20 trials each of which included one topic and two response periods of approximately 28 seconds. The interresponse interval was approximately 5 seconds and the intertrial interval, 45 seconds. For the Experimental and C-100 Groups, each trial was presented as follows: A topic was presented followed by the sound of the bell. The yellow light came on when the bell sounded, indicating the beginning of the first 28 second period (R1). The termination of R1 was signaled by the onset of a buzzer (for 1 second) and the offgo of the yellow light. Immediately following R1, either reward or nonreward occurred. Five seconds later, the bell sounded again and the yellow light came on indicating the beginning of R2. R2, which was terminated by the onset of the buzzer and the offgo of the light, was always followed by reward. Reward consisted of a verbal reward statement (see Appendix A). Nonreward was indicated by silence.

The procedure for the C-0 Group was the same as that described above except that no reward statements were presented after either R1 or R2.

The first four trials of the Experimental Group's interview were "training" trials in which both R1 and R2 were rewarded. Beginning with Trial 5, the Experimental Group received 50 percent reward following R1. Nonreward occurred on a random basis within the condition that no more than two trials of the same type occurred sequentially. As mentioned earlier, the C-100 Group received reward after R1 while the C-0 Group received nonreward after R1. Table 1 exhibits the order of trial presentations for the Experimental Group.

TABLE 1

ORDER OF REWARD AND NONREWARD PRESENTATIONS FOLLOWING THE FIRST RESPONSE IN THE EXPERIMENTAL CONDITION

Block	Trial	Type of Trial*
	Training	
1	1	+
	2	+
	3	+
	4	+
2	5	-
	6	+
	7	+
	8	-
3	9	+
	10	-
	11	+
	12	-
4	13	-
	14	+
	15	+
	16	-
5	17	+
	18	-
	19	-
	20	+

*+ = rewarded
 - = nonrewarded

CHAPTER IV

RESULTS

It was hypothesized that Ss in the Experimental Group would show an increase in Phonation and Verbal Rates on nonrewarded test trials; i.e., would manifest a Frustration Effect (FE). Also, it was predicted that High Anxious Ss would show higher Phonation and Verbal Rates than Low Anxious Ss. No prediction was made concerning the effect of frustrative nonreward on the Latency of R2. It was assumed that Ss in the C-0 Group would show less verbal responsivity than those in the C-100 Group as a manifestation of the reinforcing role of the reward statements.

Sex Differences and Verbal Responsivity

An attempt was made to equate the number of males and females in each group. A chi-square analysis of the deviations of the ratios of males and females per cell from the expected overall ratio (51 males versus 45 females; ratio, 8.5/7.5) did not reach statistical significance ($\chi^2 = 3.38$, $df = 5$). Clearly, no condition was sex biased.

An investigation of the effects of gender on Phonation Rates, Verbal Rates, and Latencies using uncorrelated *t* tests produced no statistically significant difference (Table 2). Thus, the data were collapsed across male and female *Ss* in all analyses that follow.

TABLE 2

UNCORRELATED *t* TESTS OF TREATMENT GROUPS, MALES VERSUS FEMALES

	Phonation Rate *t*	Verbal Rate *t*	Latency *t*
Experimental			
High Anxious	.2498	.0042	.6692
Low Anxious	.9787	.1523	.7261
C-100			
High Anxious	2.0895	.0298	.6287
Low Anxious	1.9299	1.5883	1.2911
C-0			
High Anxious	1.5983	1.3280	1.1440
Low Anxious	1.3888	1.1673	.5658

Development of Frustration Effect

Analyses of the dependent variables (Phonation Rate, Verbal Rate, and Latency) to determine the effects of frustrative nonreward were Lindquist Type III analyses of variance (Lindquist, 1953) with Trait Anxiety (High versus Low) and Treatment Group (Experimental versus C-100) as between-subject variables and the Type of Trial (R+ versus R-) as the within-subject variable. The .05 level of confidence was adopted as indicating statistical significance in all analyses.

Phonation Rate

Phonation Rate or Articulation Rate is defined as the speed of producing speech and was determined by dividing the number of syllables spoken in R2 by the time required to speak them (pause times excluded). The results of the Lindquist Type III analysis of variance of Mean Phonation Rates for the R- and R+ test trials for each group are shown in Table 3. The Type of Trial X Treatment interaction produced a statistically significant *F* ratio ($F = 7.0734$, $p < .005$). The *F* ratios of the other comparisons did not reach statistical significance. Examination of simple effects, using correlated *t* tests, indicated that *S* in the Experimental Group showed a statistically significant increase in Mean Phonation Rates on R- trials as compared with R+ trials ($t = 2.96$, $p < .005$). *Ss* of the C-100 Group showed no statistically significant Type of Trial difference ($t = .99$, ns.). These results support the hypothesis that *Ss* experiencing frustrative nonreward

TABLE 3

SUMMARY TABLE--LINDQUIST TYPE III

ANALYSIS OF VARIANCE,

MEAN PHONATION RATE

	SS	df	MS	F
Source (Between-S)				
A (Anxiety)	0.6037	1	0.6037	1.0721
B (Treatment)	0.0021	1	0.0021	0.0037
A X B	0.5926	1	0.5926	1.0523
error	33.7892	60	0.5631	
Source (Within-S)				
C (Type of Trial	0.0355	1	0.0355	1.2412
A X C	0.0409	1	0.0409	1.4300
B X C	0.2023	1	0.2023	7.0734*
A X B X C	0.0304	1	0.0304	1.0629
error	1.7197	60	0.0286	

*p <.005; one-tail test

should show higher Phonation Rates than Ss experiencing reward exclusively.

Figure 1 depicts the development of FE across trial blocks. Viewing the development of the FE seen in

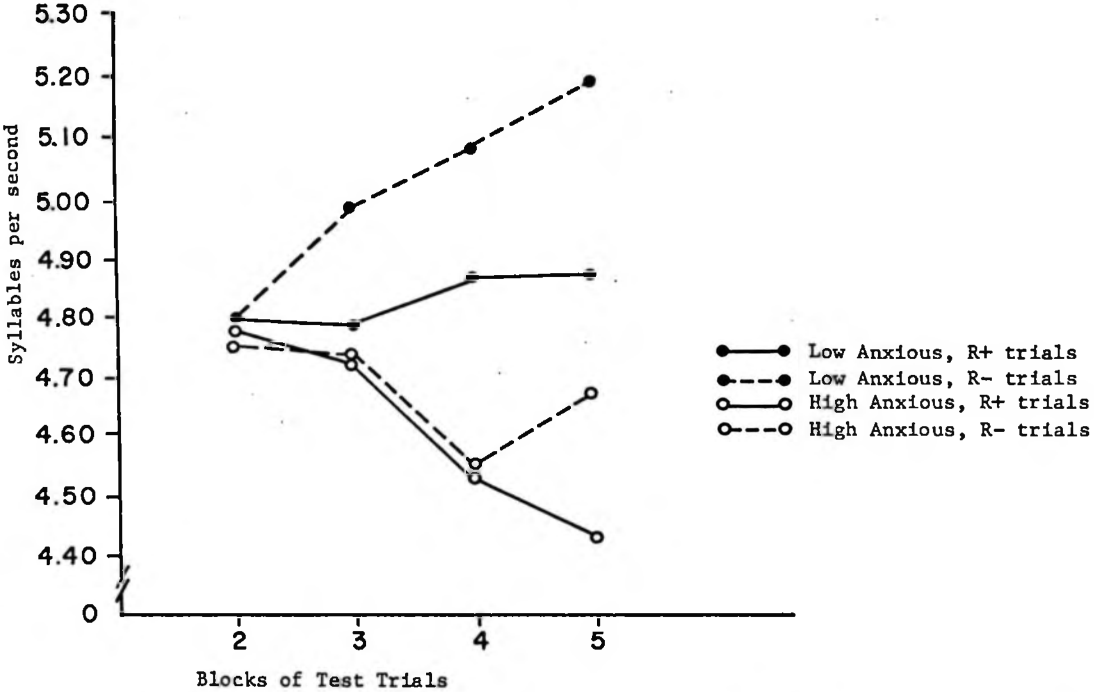

FIG. 1. Mean Phonation Rates of R+ and R- Trials across trial blocks for High and Low Anxious Experimental Groups.

the Experimental Ss' Mean Phonation Rates across four blocks of four test trials (two R+ and two R-), it appears that the Low Anxious Experimental Ss exhibited a gradual development of FE. Correlated t tests of the blocked data suggest an increase of Mean Phonation Rates on R- trials in Blocks 4 and 5, but not Blocks 2 and 3. A slightly different development of FE is suggested in High Anxious Experimental Ss. Block 5 shows a statistically significant increase of Phonation Rates on R- trials, but Blocks 2, 3, and 4 do not. These t tests are summarized in Table 4. The p values cited in Table 4 ignore data selection.

The between-groups treatment comparison in the Type III analysis of variance (Table 3) shows an F value approaching zero (0.0037). This F value represents a statistically significant departure from the chance expectancy of 1.00, and implies "forced concordance" (i.e., some factor limiting the variability of Phonation Rates). Similar outcomes are found in the analyses of Mean Verbal Rates and Mean Latencies.

Verbal Rate

Verbal Rate is a speech rate measure which takes pause time into consideration. It is determined by dividing the number of syllables by the sum of speaking

TABLE 4

CORRELATED *t* TESTS OF PHONATION RATES

OF THE EXPERIMENTAL GROUP,

R+ VERSUS R- TRIALS

Group	Trial Block	*t*
High Anxiety	2	0.03
	3	0.03
	4	0.45
	5	2.12*
Low Anxiety	2	0.06
	3	1.25
	4	2.10*
	5	2.18**

*p <.05; one-tail test
**p <.025; one-tail test

plus pause times. In this study, Verbal Rate is a measure of the quantity of speech per 28 second response period. In calculating the denominator of the Verbal Rate ratio, however, speaking time plus pause time was corrected by subtracting the Latency of R2 from the total response period of 28 seconds. A Lindquist Type III analysis of variance of Mean Verbal Rates for R- and R+ test trials for each group (Table 5) shows no statistically significant main effects or interactions. Thus, these results lend no support to the hypothesis of Frustration.

TABLE 5

SUMMARY TABLE--LINDQUIST TYPE III

ANALYSIS OF VARIANCE,

MEAN VERBAL RATES

	SS	df	MS	F
Source (Between-S)				
A (Anxiety)	0.1068	1	0.1968	0.3324
B (Treatment)	0.0047	1	0.0047	0.0079
A X B	1.9702	1	1.9702	3.3328
error	35.5202	60	0.5920	
Source (Within-S)				
C (Type of Trial)	0.0195	1	0.0195	0.5945
A X C	0.0007	1	0.0007	0.0213
B X C	0.0001	1	0.0001	0.0030
A X B X C	0.0123	1	0.0123	0.3750
error	1.9734	60	0.0328	

Latency

Latency was measured in tenths of a second from the onset of the bell signaling the initiation of R2 (onset of speech). The Lindquist Type III analysis of variance of these data is presented in Table 6. The Type

TABLE 6

SUMMARY TABLE--LINDQUIST TYPE III

ANALYSIS OF VARIANCE,

MEAN LATENCIES

	SS	df	MS	F
Source (Between-S)				
A (Anxiety)	1.0822	1	1.0822	0.7307
B (Treatment)	0.8144	1	0.8144	0.5498
A X B	0.0036	1	0.0036	0.0024
error	88.8636	60	1.4810	
Source (Within-S)				
C (Type of Trial	0.0100	1	0.0100	0.1400
A X C	0.9502	1	0.9502	13.3081*
B X C	0.1503	1	0.1503	2.1050
A X B X C	0.1677	1	0.1677	2.3487
error	4.2861	60	0.0714	

*p <.005; two-tail test

of Trial X Anxiety interaction is statistically significant (F = 13.3081, p <.005). The examination of simple effects in correlated t tests indicates that High Anxious Ss show a statistically significant decrease in latency on R- trials as compared with R+ trials. The Low Anxious *Ss* show a statistically significant increase of latency on R- trials. This analysis is collapsed across treatment groups, thus, it is difficult to understand why the C-100 Group would show a "Type of Trial" X Anxiety effect. In all trials of the C-100 interview, reward was presented following R1. Thus, it seems reasonable to look more closely at these data even though the Type of Trial X Anxiety X Treatment interaction does not reach statistical significance. Again, using correlated *t* tests, it was found that only the High Anxious Experimental *Ss* showed an overall decrease of latency on R- trials, while the Low Anxious C-100 *Ss* showed an overall increase in Latency on yoked R- trials. Also, the apparent difference in Latency of the High Anxious *Ss*' R+ trials and the R+ trials of the Low Anxious *Ss* was not statistically significant. These *t* tests are summarized in Table 7.

The Effect of Reward in Control Groups

The C-100 Group was chosen as the FE control because it was assumed that no frustration would be elicited when *Ss* were always rewarded with verbal statements. However, the question of the rewarding properties of verbal statements seemed a factor worth examining. The C-O Group was included in the design to test the reinforcing properties of the verbal statements used in the interview. It

TABLE 7

CORRELATED *t* TESTS OF LATENCY DATA, R+ VERSUS R-;
UNCORRELATED *t* TESTS OF LATENCY DATA, R+ TRIALS

	t
Treatment Group	
High Anxious Experimental	2.31*
Low Anxious Experimental	1.98
High Anxious C-100	1.58
Low Anxious C-100	2.41*
Comparison Groups	
High Anxious Experimental versus Low Anxious Experimental	1.46
High Anxious versus Low Anxious	1.71

*$p < .05$; two-tail test

was reasoned that if the verbal statements were rewarding, then the C-100 Ss would show greater verbal responsivity than the C-O Ss. This assumption was tested by two-way factorial analyses of variance (Lindquist, 1953) with Anxiety and Treatment Group (C-100 versus C-O) as the comparison groups and Phonation Rate, Verbal Rate, and Latency as dependent variables.

Phonation Rate

The two-way factorial analysis of variance of Mean Phonation Rates shown in Table 8 reveals no statistically significant *F* ratios. Thus, the hypothesis that C-100 *Ss* would speak faster than C-O *Ss* was not supported.

TABLE 8

SUMMARY TABLE--TWO-WAY FACTORIAL ANALYSIS OF VARIANCE, MEAN PHONATION RATES OF CONTROL GROUPS

Source	SS	df	MS	F
A (Anxiety)	0.1008	1	0.1008	0.3342
B (Treatment)	0.0016	1	0.0016	0.0053
A X B	0.0992	1	0.0992	0.3289
error	18.0990	60	0.3016	

Verbal Rate

The analysis of Mean Verbal Rates (Table 9) shows a statistically significant main effect for the Treatment Groups. Computation of the means of the treatment groups indicated that the C-100 *Ss* (mean of 3.06 syllables per second) produced more speech than the C-O *Ss* (mean of 2.72 syllables per second).

TABLE 9

SUMMARY TABLE--TWO-WAY FACTORIAL ANALYSIS OF VARIANCE, MEAN VERBAL RATES OF CONTROL GROUPS

Source	*SS*	*df*	*MS*	*F*
A (Anxiety)	0.0451	1	0.0451	0.1570
B (Treatment)	1.8023	1	1.8023	6.2754*
A X B	0.7877	1	0.7877	2.7426
error	17.2355	60	0.2872	

*p <.025; one-tail test

Latency

The two-way factorial analysis of variance of Mean Latencies indicates no statistically significant effects (Table 10). Thus, C-100 *Ss* did not respond faster than C-0 *Ss*.

The Effect of Trait Anxiety on Speech Rates

It was predicted that High Anxious *Ss* would show higher Phonation and Verbal Rates than Low Anxious *Ss*. The Lindquist Type III analyses of variance of Mean

TABLE 10

SUMMARY TABLE--TWO-WAY FACTORIAL ANALYSIS OF VARIANCE, MEAN LATENCIES OF CONTROL GROUPS

Source	SS	df	MS	F
A (Anxiety)	0.0003	1	0.0003	0.0004
B (Treatment)	0.2116	1	0.2116	0.2862
A X B	0.5635	1	0.5635	0.7624
error	44.3467	60	0.7391	

Phonation Rates and Mean Verbal Rates shown in Tables 3 and 5 reveal no statistically significant main effects or interactions. Thus, the hypothesis that Ss with High Trait Anxiety scores would respond at a faster rate was not supported in this study.

CHAPTER V

DISCUSSION

Amsel (1958) proposed that frustrative nonreward exerts an invigorating effect on immediately subsequent behavior (FE). Frustrative nonreward occurs when an expectancy of reward is "disconfirmed." Once expectancy is established by rewarding the instrumental response, the occurrence of nonreward following the instrumental response produces an aversive, motivating, emotional condition: frustration. Frustration or FE is reflected in a subsequently invigorated instrumental response.

To generalize Amsel's theory to adult human verbal behavior requires an experimental situation analogous to Amsel's paradigm of two serially arranged instrumental responses, followed by reward, and attention to parameters of speech which reflect invigoration. In this study, an audio taped standardized interview requiring college students to produce two verbal responses (per discrete trial), followed by verbal reward statements, seemed a feasible analogy to Amsel's paradigm. Three parameters of speech, Phonation Rate, Verbal Rate, and Latency were the dependent variables measured. Phonation

Rate and Latency resemble Amsel's movement speed and starting speed. Verbal Rate is a measure of speech quantity within a given unit of time.

It was predicted that Ss would speak faster and produce more speech when they experienced frustrative nonreward than when they experienced reward. The results of the study showed that both High and Low Anxious Ss experiencing frustrative nonreward did speak faster (Phonation Rate) on nonrewarded trials than on rewarded trials. Although the Anxiety X Type of Trial X Treatment Group interaction did not reach statistical significance, there was demonstrated a trend for the Low Anxious Experimental Ss to exhibit a gradual development of FE across trial blocks, whereas the High Anxious Experimental Ss showed a delayed development of FE across blocks of trials. This delayed development of FE may be a function of the interaction of the two emotional factors, anxiety and frustration. Perhaps this interaction interferes with the development of FE.

These same Ss did not produce more speech (high Verbal Rate) on nonrewarded trials. Apparently, Phonation Rate is sensitive to frustration, while Verbal Rate is not. On nonrewarded trials, Ss spoke more rapidly, but this increase in rate did not result in an overall increase in speech quantity. Verbal Rate (syllables/pause time plus speaking time) differs from Phonation Rate (syllables/ speaking time only) in respect to the inclusion of pause times. Thus, Ss did not pause less on nonrewarded trials. Talking about topics may in general, require S to pause in order to plan what to say. Also, of course, pauses are required for breathing.

When Latency becomes the dependent variable, FE is indexed as a decrease in Latency (or an increase in starting speed). In this study, an Anxiety X Treatment Group interaction indicated that High Anxious Ss yield a decrease in Latency on nonrewarded trials, while Low Anxious Ss show an increase. Note that this interaction ignores treatment groups. Because the C-100 Ss never experienced nonreward (the R+ and R- trials were so designated only in correspondence to the R+ and R- trials of the Experimental interview), a closer analysis of the Latency data by groups was performed. The results indicated that, while the Anxiety X Type of Trial X Treatment Group interaction was not statistically significant, there were differences in the data when analyzed by groups. For instance, only the High Anxious Experimental Ss showed a significant decrease in Latency on R- trials. Also, only the Low Anxious C-100 Ss demonstrated an increase in Latency on yoked R- trials. The results obtained for the High Anxious Experimental Ss seem reasonable in that previous studies have found FE reflected in increased starting speeds. However, the results obtaining for the Low Anxious C-100 Group are surprising. The question arises as to why these Ss showed an increase on yoked R- trials. An examination of individual data in this group reveals that, when the test trials were divided into four blocks (two R+ and two R- trials), only the last block yielded a statistically significant increase in Latency on yoked R- trials. In this block of trials, the Mean Latency for the yoked R- trials was 1.93 seconds; for the yoked R+ trials, 1.41 seconds. In comparison with the Mean Latencies of the other blocks (Table 11), it is apparent that the Mean Latency of 1.41 is considerably briefer than the others. This implies that the crucial factor is not that Latency increases on yoked R- trials, but that it decreases on yoked R+ trials. While this closer analysis was informative, the reason for this result remains obscure. Topical influence should not be a factor because topics were counterbalanced. Either a chance factor or an unknown and thus uncontrolled factor influenced the Latencies in this group.

Summarizing, it appears clearly that an FE, reflected in Phonation Rate, was demonstrated by Ss who experienced frustrative nonreward. Verbal Rate, or quantity of speech, proved insensitive to the Frustration Effect, probably because pauses in speech do not reflect

TABLE 11

MEAN LATENCIES OF LOW ANXIOUS
C-100 SUBJECTS, "R+" AND "R-"
TRIALS ACROSS BLOCKS

Block	Mean Latency +	Mean Latency -
2	1.61	1.72
3	1.70	1.81
4	1.84	1.78
5	1.41	1.93

invigoration of the verbal response. The Latency of the verbal response showed an apparent FE in High Anxious Experimental *Ss*, but the *Ss* in the Low Anxious C-100 Group yielded the reverse effect. Thus, chance or an uncontrolled factor seemed to influence the C-100 *Ss*.

"Forced Concordance"

In each of the Lindquist Type III analyses of variance of the three dependent variables, a significantly low *F* ratio occurred implying that some factor or factors operated to restrict the variability of the data. Procedural factors which may operate in this fashion are the 28-second response period and *Ss*' compliance. Such F values were not found in a similar interview situation (Allen, 1971) using Phonation and Verbal Rates as dependent variables, but one in which the Ss were allowed to speak as long as they paused for no more than three seconds. Perhaps 28 seconds is too brief a time to allow S to exhaust his comments, thus creating a ceiling effect. Subjects' compliance is another factor which may have influenced the variability of the data. Only 2 of the 98 Ss showed noncompliance to the experimental task. These two Ss did not respond throughout the interviews and were not included in the data analyses. Generally, the other Ss tended to respond to all topics. It is possible that these Ss felt compelled to talk until the signal occurred for them to stop talking. Such compliance to the instructions may have influenced the overall variability of the speech rates and latencies.

Verbal Reward

The development of FE, according to Amsel's theory, requires that anticipation or expectancy of reward occur. The results of the present study imply that the verbal reward statements were indeed functioning as reinforcers. However, of the three dependent variables, only Mean Verbal Rate revealed a difference in C-100 and C-O Control Groups. The C-100 Ss produced more speech than the C-O Ss, but at neither a faster rate nor with a shorter latency.

It is disappointing that Mean Phonation Rate, which indexed FE, does not reflect the effects of reward in the control group. Does this mean that the verbal statements were not reinforcing? The statements could have been reinforcing for the Experimental Ss, but not for the C-100 or C-O Ss because of the differing contexts in which the statements occurred. For instance, the Experimental Ss received reward statements in an atmosphere of "uncertainty," produced by the intermittent occurrence of non-reward. The C-100 Ss received reward statements after each response, and the C-O Ss never received reward after any response. Thus, there was no intra-subject variation in the presentation of the reward statements in the C-100 and C-O interviews. The effect of intra-subject variation is discussed by Hall (1966). He comments that

> . . . the amount of reward variable should not be considered a static parameter; its influence depends upon the context in which a given amount or reward occurs [Hall, 1966, p. 187].

He cites several animal studies (Crespi, 1955; Schrier, 1958; Zeaman, 1949) in which intra-subject responses to varying amounts of reward are more marked than inter-subject responses. Siegel, Forman, and Williams (1967) have presented a similar argument. It would appear that comparison between the C-100 and C-O Groups provides little sensitivity to reinforcement effects, and thus, was inappropriately chosen in designing the study.

Anxiety and Speech Rate

Previous research (Benton, Hartman, & Sarason, 1955; Cervin, 1956, 1957; Eisenman, 1966; Siegman & Pope, 1965b) has shown that people who score high on the Manifest Anxiety Scale (basically a measure of Trait Anxiety), or some other scale of emotional responsiveness, produce more speech with a shorter latency, and, in some cases, at a faster rate. Thus, Trait Anxiety was incorporated as an independent variable to control the effects of anxiety and to determine if there were an interaction of the two emotional factors, anxiety and frustration. The results of this study did not find anxiety to be a main effect or an interacting factor. There was a tendency toward gradual development of FE reflected in Phonation Rates across blocks of trials within the Low Anxious Experimental Group; delayed within the High Anxious Experimental Group. However, this interaction was not statistically significant. Interaction of Anxiety and Type of Trial was found in the Latency analysis and has already been discussed. Broadly, the hypothesis that High Anxious Ss speak more, at a faster rate, and with a shorter latency than Low Anxious Ss was not supported. Perhaps, eliminating from the sample subjects scoring in the external range of the LOC of reinforcement questionnaire and those scoring in the middle of the distribution of Trait Anxiety Scores may have biased the present results in relation to anxiety.

CHAPTER VI

SUMMARY AND CONCLUSIONS

At the beginning of this paper, it was predicted that college students experiencing frustrative nonreward would show a Frustration Effect reflected in increased vigor of speech. This hypothesis was confirmed in that subjects experiencing frustrative nonreward exhibited increased Mean Phonation Rates on nonrewarded trials. However, these subjects did not produce more speech. High Anxious Experimental subjects showed an apparent FE as reflected in shorter latencies on nonrewarded trials.

It was also predicted that High Anxious subjects would produce more speech with faster rates. This hypothesis was not confirmed, possibly because of limitations imposed on the subject population.

Finally, it was expected that subjects always receiving verbal reward for talking would exhibit greater verbal responsivity than subjects who received no verbal reward. This assumption was not confirmed by Phonation Rate, the variable which reflected FE, nor by Latency. Reconciliation here may lie in the lack of sensitivity to reward manipulation in inter-group comparisons. Subjects always experiencing reward did produce more speech than those receiving no rewards (high Verbal Rate).

It is concluded that Amsel's theory of frustrative nonreward may be generalized to the verbal behavior realm of adult humans.

REFERENCES

REFERENCES

Allen, J. C. An investigation of two speech rate measures in a standardized video-tape interview. Unpublished M.A. thesis, University of Alabama, 1971.

Amsel, A. The role of frustrative nonreward in noncontinuous reward situations. Psychological Bulletin, 1958, 55, 103-119.

Amsel, A. Frustrative nonreward in partial reinforcement and discrimination learning: Some recent history and a theoretical extension. Psychological Review, 1962, 69, 306-328.

Amsel, A. Frustration, persistence, and regression. Paper presented at the meeting of the University of South Florida Symposium on Experimental Psychopathology, 1969.

Amsel, A., Ernhart, C. B., & Galbrecht, C. R. Magnitude of frustration effect and strength of antedating goal factors. Psychological Reports, 1961, 8, 183-186.

Amsel, A., & Hancock, W. Motivational properties of frustration: III. Relation of frustration effect to antedating goal factors. Journal of Experimental Psychology, 1957, 53, 126-131.

Amsel, A., & Roussel, J. Motivation properties of frustration: I. Effect on a running response of the addition of frustration to the motivational complex. Journal of Experimental Psychology, 1952, 43, 363-368.

Ball, R. S. Reinforcement conditioning of verbal behavior by verbal and nonverbal stimuli in a situation resembling a clinical interview. Unpublished doctoral dissertation, Indiana University, 1953. Cited in J. Greenspoon, Verbal conditioning and clinical psychology. In A. J. Bachrach (Ed.), Experimental foundations of clinical psychology. New York: Basic Books, 1962.

Benton, A. L., Hartman, C. H., & Sarason, I. G. Some relations between speech behavior and anxiety level. Journal of Abnormal and Social Psychology, 1955, 51, 295-297.

Butterfield, E. C. Locus of control, test anxiety, reactions to frustration, and achievement attitudes. Journal of Personality, 1964, 32, 355-370.

Cattell, R. B., & Scheier, I. H. The nature of anxiety: A review of thirteen multivariate analyses comprising 814 variables. Psychological Reports, 1958, 4, 351-388.

Cattell, R. B., & Scheier, I. H. The meaning and measurement of neuroticism and anxiety. New York: Ronald Press, 1961.

Cervin, V. Individual behavior in social situations: Its relation to anxiety, neuroticism, and group solidarity. Journal of Experimental Psychology, 1956, 51, 161-168.

Cervin, V. Relationship of ascendant-submissive behavior in dyadic groups of human subjects to their emotional responsiveness. Journal of Abnormal and Social Psychology, 1957, 54, 241-249.

Cohen, B. D., Kalish, H. I., Thurston, J. R., & Cohen, E. Experimental manipulation of verbal behavior. Journal of Experimental Psychology, 1954, 47, 106-110.

Crespi, L. P. Quantitative variation of incentive and performance in the white rat. American Journal of Psychology, 1942, 55, 467-517.

Davenport, J. W., Flaherty, C. F., & Dryud, J. P. Temporal persistence of frustration effects in monkeys and rats. Psychonomic Science, 1966, 6, 411-412.

Davenport, J. W., & Thompson, C. I. I. The Amsel frustration effect in monkeys. Psychonomic Science, 1965, 3, 481-482.

Drennan, W. T., & Wiggins, S. L. Manipulation of verbal behavior of chronic hospitalized schizophrenics in a group therapy situation. International Journal of Group Psychotherapy, 1964, 14, 189-193.

Eisenman, R. Birth order, anxiety, and verbalizations in group psychotherapy. Journal of Consulting Psychology, 1966, 30, 521-526.

Endsley, R. C. Effortfulness and blocking at different distances from the goal as determinants of response speed and amplitude. Journal of Experimental Child Psychology, 1966, 3, 18-30.

Ford, L. H., Jr. Reaction to failure as a function of expectancy for success. Journal of Abnormal and Social Psychology, 1963, 67, 340-348.

Garrett, H. E. Statistics in psychology and education. New York: David McKay Company, Inc., 1964.

Goldman-Eisler, F. A study of individual differences and of interaction in the behavior of some aspects of language in interviews. Journal of Mental Science, 1954(a), 100, 177-197.

Goldman-Eisler, F. On the variability of the speed of talking and its relation to the length of utterances in conversation. British Journal of Psychology, 1954(b), 45, 94-107.

Goldman-Eisler, F. The determinants of the rate of speech output and their mutual relations. Journal of Psychosomatic Research, 1956, 1, 137-143.

Greenspoon, J. The reinforcing effect of two spoken sounds on the frequency of two responses. American Journal of Psychology, 1955, 68, 409-416.

Greenspoon, J. Verbal conditioning and clinical psychology. In A. J. Bachrach (Ed.), Experimental foundations of clinical psychology. New York: Basic Books, 1962.

Guilford, J. P. Psychometric methods. New York: McGraw-Hill Book Company, Inc., 1954.

Hall, J. F. The psychology of learning. New York: J. B. Lippincott Company, 1966.

Hall. W. E. The effects of set and reinforcement in verbal conditioning. Unpublished doctoral dissertation, University of Connecticut, 1958. Cited in J. Greenspoon, Verbal conditioning and clinical psychology. In A. J. Bachrach (Ed.), Experimental foundations of clinical psychology. New York: Basic Books, 1962.

Haner, C. F., & Brown, P. A. Clarification of the instigation to action concept in the frustration-agression hypothesis. Journal of Abnormal and Social Psychology, 1955, 51, 204-206

Hildum, D. C., & Brown, R. W. Verbal reinforcement and interviewer bias. Journal of Abnormal and Social Psychology, 1956, 53, 108-111.

Holden, K. B., & Rotter, J. B. Supplementary Report: A nonverbal measure of extinction in skill and chance situations. Journal of Experimental Psychology, 1962, 63, 519-520.

James, W. H., & Rotter, J. B. Partial and 100% reinforcement under chance and skill conditions. Journal of Experimental Psychology, 1958, 55, 397-403.

Kanfer, F. H. Verbal rate, contents and adjustment ratings in experimentally structured interviews. Journal of Abnormal and Social Psychology, 1959, 58, 305-311.

Kanfer, F. H. Verbal rate, eyeblink, and content in structured psychiatric interviews. Journal of Abnormal and Social Psychology, 1960, 61, 341-347.

Kanfer, F. H. Verbal conditioning: A review of its current status. In T. R. Dixon and D. L. Horton (Eds.), Verbal behavior and general behavior theory. New Jersey: Prentice-Hall, Inc., 1968.

Kanfer, F. H., & Karas, S. Prior experimenter-subject interaction and verbal conditioning. Psychological Reports, 1959, 5, 343-353.

Lefcourt, H. M. Internal versus external control of reinforcement: A review. Psychological Bulletin, 1966, 4, 206-220.

Lefcourt, H. M. Effects of one explication upon persons maintaining external control expectancies. Journal of Personality and Social Psychology, 1967, 5, 372-378.

Levin, H., Baldwin, A. L., Gallway, M., & Paivio, A. Audience stress, personality, and speech. Journal of Abnormal and Social Psychology, 1960, 61, 469-473.

Libb, J. W. Frustration and task complexity: An extension of frustration theory. Unpublished manuscript, University of Alabama, 1970. Cited in C. S. Serum, The interaction of locus of control of reinforcement and frustration effect. Unpublished M.A. thesis, University of Alabama, 1972.

Lindquist, E. F. Design and analysis of experiments in psychology and education. Boston: Houghton Mifflin, 1953.

MacKinnon, J. R., & Amsel, A. Magnitude of the frustration effect as a function of degree of confinement and detention in the frustrating situation. Journal of Experimental Psychology, 1964, 67, 468-474.

Martin, E. W. The study of speech in interpersonal relationships; techniques for analyzing rate relationships in a counseling situation. Unpublished M.A. thesis, University of Alabama, 1955.

Matarazzo, J. D., Saslow, G., & Hare, A. P. Factor analysis of interview interaction behavior. Journal of Consulting Psychology, 1958, 22, 419-429.

Miller, G. R. Variations in the verbal behavior of a second speaker as a function of varying audience responses. Speech Monographs, 1964, 31, 109-115.

Miller, G. R., Zavos, H., Vlandis, J. W., & Rosenbaum, M. E. The effect of differential reward on speech patterns. Speech Monographs, 1961, 28, 9-15.

Moffitt, A. R., & Ryan, T. J. The frustration effect in normal and retarded children using a one-trial-a-day procedure. University of Western Ontario Research Bulletin, 1966, No. 15.

Mowrer, O. H. Learning theory and behavior. New York: John Wiley & Sons, Inc., 1960.

Murray, D. C. Talk, silence, and anxiety. Psychological Bulletin, 1971, 75, 244-260.

Newmark, C. S. Systematic stimulus control of non-content verbal behavior as a function of state and trait anxiety. Unpublished doctoral dissertation, University of Alabama, 1971.

Penny, R. K. The effects of nonreinforcement on response strength as a function of number of previous reinforcements. Canadian Journal of Psychology, 1960, 14, 206-215.

Phares, E. J. Expectancy changes in skill and chance situations. Journal of Abnormal and Social Psychology, 1957, 54, 339-342.

Pope, B., & Siegman, A. W. Interviewer warmth and verbal communication in the initial interview. Proceedings of the 75th Annual Convention of the American Psychological Association, 1967, 2, 245-246.

Reece, M. M. Climate and temporal verbal reinforcement. Journal of Clinical Psychology, 1964, 20, 284-286.

Reece, M. M., & Whitman, R. N. Expressive movements, warmth, and verbal reinforcement. Journal of Abnormal and Social Psychology, 1962, 64, 234-236.

Rosenblum, J. Examiner presence, levels of anxiety, and verbal conditioning. Unpublished doctoral dissertation, Florida State University, 1959. Cited in J. Greenspoon, Verbal conditioning and clinical psychology. In A. J. Bachrach (Ed.), Experimental foundations of clinical psychology. New York: Basic Books, 1962.

Rotter, J. B. Social learning and clinical psychology. Englewood Cliffs, New Jersey: Prentice-Hall, 1954.

Rotter, J. B. Generalized expectancies for internal versus external control of reinforcement. Psychological Monographs, 1966, 80 (1, Whole No. 609).

Rotter, J. B., Liverant, S., & Crowne, D. P. The growth and extinction of expectancies in chance controlled and skilled tasks. Journal of Psychology, 1961, 52, 161-177.

Roussel, J. Frustration effect as a function of repeated non-reinforcements and as a function of the consistency of reinforcement prior to the introduction of non-reinforcement. Unpublished M.A. thesis, Tulane University, 1952. Cited in A. Amsel, The role of frustrative nonreward in noncontinuous reward situations. Psychological Bulletin, 1958, 55, 103-119.

Ryan, T. J. The effects on nonreinforcement and incentive value on response speed. Unpublished doctoral dissertation, State University of Iowa, 1963. Cited in T. J. Ryan & P. Watson, Frustrative nonreward theory applied to children's behavior. Psychological Bulletin, 1968, 69, 111-125.

Ryan, T. J. The effects of nonreinforcement and incentive value on response speed. Child Development, 1965, 36, 1067-1081

Ryan, T. J., & Watson, P. Frustrative nonreward theory applied to children's behavior. Psychological Bulletin, 1968, 69, 111-125.

Salzinger, K., & Pisoni, S. Reinforcement of affect responses of schizophrenics during the clinical interview. Journal of Abnormal and Social Psychology, 1958, 57, 84-90.

Salzinger, K., & Pisoni, S. Reinforcement of verbal affect responses of normal subjects during the interview. Journal of Abnormal and Social Psychology, 1960, 60, 127-130.

Sauer, R. E., & Marcuse, F. L. Overt and covert recording. Journal of Projective Techniques, 1957, 21, 391-395.

Schmeck, R. R., & Bruning, J. L. Task difficulty and the frustration effect. Journal of Experimental Psychology, 1968, 78, 516-520.

Schrier, A. M. Comparison of two methods of investigating the effect of amount of reward on performance. Journal of Comparative and Physiological Psychology, 1958, 51, 725-731.

Scull, K. W. The Amsel frustration effect: Interpretations and research. Psychological Bulletin, 1973, 79, 352-361.

Serum, C. S. The interaction of locus of control of reinforcement and frustration effect. Unpublished M.A. thesis, University of Alabama, 1972.

Siegel, P. S., Forman, G. E., & Williams, J. An exploratory study of incentive motivation in the retardate. American Journal of Mental Deficiency, 1967, 71, 977-983.

Siegman, A. W., & Pope, B. Effects of question specificity and anxiety producing messages on verbal fluency in the initial interview. Journal of Personality and Social Psychology, 1965(a), 2, 522-530.

Siegman, A. W., & Pope, B. Personality variables associated with productivity and verbal fluency in the initial interview. Proceedings of the 73rd Annual Convention of the American Psychological Association, Washington, D.C.: APA, 1965(b).

Siegman, A. W., & Pope, B. The effect of interviewer ambiguity-specificity and topical focus on interviewee vocabulary diversity. Language and Speech, 1966, 9, 242-249.

Solley, C. M., & Long, J. When is "uh-huh" reinforcing? Perceptual and Motor Skills, 1958, 8, 277.

Spence, K. W. A theory of emotionally based drive (D) and its relation to performance in simple learning situations. American Psychologist, 1958, 13, 131-141.

Spence, K. W. Anxiety (drive) level and performance in eyelid conditioning. Psychological Bulletin, 1964, 61, 129-139.

Spence, J. T., & Spence, K. W. The motivational components of manifest anxiety: Drive and drive stimuli. In C. D. Spielberger, Anxiety and behavior. New York: Academic Press, 1966.

Spielberger, C. D. Theory and research on anxiety. In C. D. Spielberger (Ed.), Anxiety and behavior. New York: Academic Press, 1966.

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. State-trait anxiety inventory, preliminary test manual. Palo Alto, Calif.: Consulting Psychologist, 1969.

Spielberger, C. D., & Levin, S. M. What is learned in verbal conditioning? Journal of Verbal Learning and Verbal Behavior, 1962, 1, 125-132.

Staddon, J. E. R., & Innis, N. K. An effect analogous to "frustration" on internal reinforcement schedules. Psychonomic Science, 1966, 4, 287-288.

Taylor, J. A. A personality scale of manifest anxiety. Journal of Abnormal and Social Psychology, 1953, 48, 285-290.

Ude, L. K., & Vogler, E. E. Internal versus external control of reinforcement and awareness in a conditioning task. Journal of Psychology, 1969, 73, 63-67.

Vlandis, J. W. Variations in the verbal behavior of a speaker as a function of varied reinforcing conditions. Speech Monographs, 1964, 31, 116-119.

Watson, P. Effects of reward schedule, type of reward and isolation condition on children's lever-pulling performance. Unpublished doctoral dissertation, University of Western Ontario, 1967. Cited in T. J. Ryan & P. Watson, Frustrative nonreward theory applied to children's behavior, Psychological Bulletin, 1968, 69, 111-125.

Watson, P. Individual differences in children's reactions to frustrative nonreward. Journal of Experimental Child Psychology, 1970, 10, 216-234.

Watson, P., & Ryan, T. J. Duration of the frustration effect in children. Journal of Experimental Child Psychology, 1966, 4, 242-247.

Webb, J. T. An analysis of two speech rate measures in an automated standardized interview. Unpublished doctoral dissertation, University of Alabama, 1967.

Willard, D. L. Frustration effect in children as a function of delaying the first instrumental response and as a function of the number of rewarded trials preceding nonreward. Unpublished doctoral dissertation, University of Alabama, 1971.

Wilson, W. C., & Verplanck, W. S. Some observations of the reinforcement of verbal operants. American Journal of Psychology, 1956, 69, 448-451.

Yelen, D. Magnitude of the frustration effect and number of training trials. Psychonomic Science, 1969, 15, 137-138.

Zeaman, D. Response latency as a function of the amount of reinforcement. Journal of Experimental Psychology, 1949, 39, 466-483.

APPENDIX A

Interview for Experimental and
C-100 Groups, Orders A and B

APPENDIX A

INTERVIEW FOR EXPERIMENTAL AND C-100 GROUPS, ORDERS A AND B

Trial, Order, and Topic	Reward Statement*	Reward Statement
1A Legalizing marijuana B " "	You are doing just fine.	That's very interesting
2A Religion B "	Yes, I see.	Hm, you're doing well.
3A Prison reform B " "	I understand how you feel.	That's very good.
4A U.S. Foreign Policy B " " "	That's interesting.	Hm, I see.
5A Presidential Election, '72 B Dating	(That's reasonable.)	You're doing well.
6A Dating B Presidential Election, '72	Hm, I understand.	You're doing just fine.
7A National Economy B Student Rights	I understand how you feel.	Hm, I see.
8A Student Rights B National Economy	(Yes, I see.)	That's reasonable.

APPENDIX A--Continued

Trial, Order, and Topic	Reward Statement*	Reward Statement
9A Music B Pass-fail Grading	You express yourself well.	You're doing fine.
10A Pass-fail Grading B Music	(I see what you mean.)	I understand.
11A Sexual Revolution B Viet Nam War	Hm, I see.	That's very good.
12A Viet Nam War B Sexual Revolution	(You're doing well.)	Hm, that's interesting.
13A Birth Control B Your Professors	(Yes, I understand.)	I see what you mean.
14A Your Professors B Birth Control	That's very good.	I appreciate your cooperation.
15A Drug Addiction B Ecology	Yes, I understand.	Hm, I see.
16A Ecology B Drug Addiction	(Hm, that's interesting.)	You express yourself well.

APPENDIX A--Continued

Trial, Order, and Topic	Reward Statement*	Reward Statement
17A Movies B Campus Recreational Activities	I understand how you feel.	That's reasonable.
18A Campus Recreational Activities B Movies	(Yes, I see.)	That's interesting.
19A Sports B Your Courses	(You present your ideas clearly.	You're doing well.
20A Your Courses B Sports	I see what you mean.	Thanks for your cooperation.

*Parentheses indicate nonrewarded trials for the Experimental Group.

APPENDIX B

Preferred Topics Questionnaire

APPENDIX B

PREFERRED TOPICS QUESTIONNAIRE

Instructions: This is a questionnaire to find out which topics you prefer to talk about. There are 86 different pairs of topics. You are to choose from each pair the one topic you <u>prefer</u> to talk about. Consider each pair separately. <u>Check</u> the one topic in each pair which you prefer to talk about if given a choice between the two. Do not spend too much time on any one pair. Give your first impression.

1. ___Pass-fail grading
___Your courses
2. ___U.S. foreign policy
___National economy
3. ___Music
___Television
4. ___Women's liberation
___Birth control
5. ___Student rights
___Civil rights
6. ___Your professors
___Campus recreational activities
7. ___President Nixon
___Presidential election 1972
8. ___Movies
___Dating
9. ___Ecology
___Civil rights
10. ___University administration
___Student rights
11. ___Viet Nam war
___Middle East conflict
12. ___Religion
___Sports
13. ___Sexual revolution
___Drug addiction
14. ___Civil rights
___U.S. foreign policy
15. ___Campus recreational activities
___Pass-fail grading
16. ___Presidential election 1972
___U.S. foreign policy
17. ___Dating
___Music
18. ___Legalizing marijuana
___Prison reform
19. ___Sports
___Middle East conflict
20. ___Your courses
___Your professors
21. ___National economy
___President Nixon
22. ___Television
___Movies

23. __Drug addiction
__Ecology

24. __Student rights
__Campus recreational activities

25. __Sports
__Dating

26. __Middle East conflict
__Presidential election 1972

27. __Civil rights
__Women's liberation

28. __U.S. foreign policy
__Sports

29. __Pass-fail grading
__University administration

30. __U.S. foreign policy
__Viet Nam war

31. __Music
__Religion

32. __Birth control
__Sexual revolution

33. __Middle East conflict
__Civil rights

34. __Your professors
__Student rights

35. __President Nixon
__Middle East conflict

36. __Movies
__Sports

37. __Prison reform
__Drug addiction

38. __Music
__U.S. foreign policy

39. __Campus recreational activities
__Your courses

40. __Presidential election 1972
__National economy

41. __Dating
__Television

42. __Ecology
__Legalizing marijuana

43. __Sports
__Student rights

44. __University administration
__Your professors

45. __Viet Nam war
__President Nixon

46. __Religion
__Movies

47. __Sexual revolution
__Prison reform

48. __Middle East conflict
__Music

49. __Student rights
__Pass-fail grading

50. __Middle East conflict
__U.S. foreign policy

51. __Sports
__Music

52. __Drug addiction
__Birth control

53. __Civil rights
__Sports

54. __Campus recreational activities
__University administration

55. __Presidential election 1972
__Viet Nam war

56. __Dating
__Religion

57. __Legalizing marijuana
__Civil rights

58. __Your courses
__Student rights

59. __National economy
__Middle East conflict

60. __Television
__Sports

61. __Women's liberation
__Sexual revolution

62. __Music
__Civil rights

63. __Pass-fail grading
__Your professors

64. __U.S. foreign policy
__President Nixon

65. __Music
__Movies

66. __Prison reform
__Ecology

67. __University administration
__Your courses

68. __Viet Nam war
__National economy

69. __Religion
__Television

70. __Drug addiction
__Legalizing marijuana

71. __Birth control
__Civil rights

72. __Middle East conflict
__Student rights

73. __Ecology
__Women's liberation

74. __Student rights
__Music

75. __Sexual revolution
__Legalizing marijuana

76. __Civil rights
__Drug addiction

77. __Women's liberation
__Prison reform

78. __Birth control
__Ecology

79. __Student rights
__U.S. foreign policy

80. __Legalizing marijuana
__Women's liberation

81. __Ecology
__Sexual revolution

82. __Prison reform
__Civil rights

83. __Women's liberation
__Drug addiction

84. __Legalizing marijuana
__Birth control

85. __Civil rights
__Sexual revolution

86. __Birth control
__Prison reform

APPENDIX C

Raw Data

TABLE A

SUMMARY OF MEAN PHONATION RATES PER BLOCK OF TEST TRIALS FOR EACH S,

HIGH ANXIETY EXPERIMENTAL GROUP

	S1	S2	S3	S4	S5	S6	S7	S8
Block 2 (R+)	4.55	4.08	5.00	4.33	5.26	6.48	4.71	5.29
(R-)	4.40	3.74	4.91	4.73	5.01	5.68	5.53	5.63
Block 3 (R+)	4.72	3.75	5.01	4.70	5.28	4.57	5.38	5.75
(R-)	4.67	3.66	5.09	5.43	5.21	4.56	5.66	5.16
Block 4 (R+)	4.27	3.84	4.90	5.32	4.73	3.96	4.82	4.93
(R-)	4.46	3.92	4.60	4.98	5.20	3.52	5.07	5.09
Block 5 (R+)	4.20	2.98	4.22	4.84	5.09	4.81	5.04	4.90
(R-)	4.50	3.63	4.81	5.13	5.45	4.54	5.13	4.76

TABLE A--Continued

		S9	S10	S11	S12	S13	S14	S15	S16
Block 2	(R+)	4.33	4.78	3.81	3.49	4.72	4.66	4.50	6.45
	(R-)	4.39	5.32	4.43	3.95	4.97	4.54	4.59	4.54
Block 3	(R+)	4.09	5.32	4.65	4.52	4.63	3.76	4.45	4.98
	(R-)	3.79	5.29	4.25	4.68	5.13	3.64	4.28	5.10
Block 4	(R+)	3.94	4.92	4.13	4.79	4.46	4.31	3.82	5.25
	(R-)	3.94	4.74	4.16	4.67	4.25	4.27	4.17	4.86
Block 5	(R+)	3.74	4.57	4.70	4.03	4.65	4.54	3.66	5.38
	(R-)	4.34	4.77	4.10	4.43	4.90	4.24	3.70	6.36

TABLE B

SUMMARY OF MEAN PHONATION RATES PER BLOCK OF TEST TRIALS FOR EACH S,

LOW ANXIETY EXPERIMENTAL GROUP

	S1	S2	S3	S4	S5	S6	S7	S8
Block 2 (R+)	4.22	4.45	5.74	4.56	4.59	4.63	4.74	7.51
(R-)	4.57	4.87	5.86	5.35	4.63	4.93	4.95	6.00
Block 3 (R+)	4.12	4.78	4.97	5.39	5.09	4.52	4.91	6.83
(R-)	4.51	4.88	5.72	5.67	4.47	4.78	4.54	5.89
Block 4 (R+)	4.22	4.94	5.84	5.26	4.38	4.99	3.72	5.82
(R-)	4.13	5.31	6.19	5.66	4.63	5.03	4.36	5.76
Block 5 (R+)	4.14	5.96	5.93	5.80	4.46	4.89	4.01	5.03
(R-)	4.60	5.94	7.22	5.59	5.18	4.72	4.25	6.05

TABLE B--Continued

	S9	S10	S11	S12	S13	S14	S15	S16
Block 2 (R+)	4.03	3.96	4.47	4.23	4.61	5.33	5.01	4.78
(R-)	3.96	3.81	4.82	4.34	4.43	4.39	5.13	4.68
Block 3 (R+)	4.64	3.73	4.54	4.61	4.66	4.74	4.67	4.36
(R-)	6.00	4.32	4.48	4.31	4.79	4.39	5.80	5.18
Block 4 (R+)	4.76	4.17	4.76	4.37	5.09	5.06	5.47	5.10
(R-)	4.06	4.54	5.16	4.62	4.86	5.97	5.70	5.10
Block 5 (R+)	3.83	4.58		4.44	4.35	4.80	6.01	4.82
(R-)	3.88	4.63	5.53	4.38	4.80	5.18	5.38	5.53

TABLE C

SUMMARY OF MEAN PHONATION RATES FOR EACH S,

EXPERIMENTAL AND C-100 GROUPS

	Experimental				C-100*			
	High		Low		High		Low	
	R+	R-	R+	R-	R+	R-	R+	R-
S1	4.43	4.51	4.17	4.45	5.43	5.46	4.17	4.39
S2	3.66	3.74	5.03	5.25	3.68	3.86	5.28	4.85
S3	4.78	4.85	5.62	6.25	5.29	4.65	4.99	4.98
S4	4.80	5.07	5.25	5.57	4.88	4.66	4.36	4.22
S5	5.09	5.22	4.63	4.73	4.63	4.67	4.70	4.78
S6	4.95	4.58	4.76	4.86	5.86	5.33	4.55	4.57
S7	4.99	5.35	4.34	4.53	4.55	4.56	4.74	4.67
S8	5.22	5.16	6.30	5.93	4.80	4.96	4.84	4.58
S9	4.02	4.12	4.31	4.48	4.62	4.52	6.02	5.62
S10	4.90	5.03	4.11	4.32	4.52	4.53	4.42	4.45
S11	4.32	4.23	4.59	5.00	3.99	4.38	4.79	4.95
S12	4.21	4.43	4.41	4.41	4.41	4.44	5.75	5.06
S13	4.61	4.81	4.68	4.72	4.20	4.32	4.22	4.42
S14	4.32	4.17	4.98	4.98	4.67	4.67	3.80	3.99
S15	4.11	4.18	5.29	5.50	5.36	5.26	4.44	4.59
S16	5.51	5.21	4.76	5.12	5.86	5.66	5.62	5.91

*R+ and R- trials of the C-100 Group are "yoked" to those in the Experimental Group.

TABLE D

SUMMARY OF MEAN VERBAL RATES FOR EACH *S*,

EXPERIMENTAL AND C-100 GROUPS

	Experimental				C-100*			
	High		Low		High		Low	
	R+	R-	R+	R-	R+	R-	R+	R-
*S*1	3.18	3.01	2.81	3.12	2.20	1.86	3.29	3.40
*S*2	2.43	2.52	3.40	3.71	3.09	3.27	1.42	2.40
*S*3	3.48	3.67	3.28	3.23	2.30	2.35	2.27	2.13
*S*4	3.42	3.31	4.46	4.53	3.05	2.85	3.31	3.16
*S*5	3.86	3.59	3.29	3.30	3.30	3.41	3.08	2.62
*S*6	2.67	2.72	3.34	3.45	2.83	3.14	3.34	3.41
*S*7	2.68	2.90	2.46	2.69	2.83	3.42	3.43	3.40
*S*8	2.64	2.63	3.80	3.31	4.39	4.24	2.32	2.35
*S*9	2.94	3.11	2.06	2.00	3.59	3.50	2.74	2.78
*S*10	3.65	3.46	3.26	3.27	3.35	3.23	2.99	2.95
*S*11	2.93	2.75	2.62	2.71	3.09	3.31	3.41	3.39
*S*12	2.84	3.39	3.20	3.16	2.63	2.62	3.55	3.65
*S*13	1.71	2.13	4.06	4.13	3.55	3.59	2.77	2.97
*S*14	2.36	2.66	3.16	2.74	2.77	2.55	2.71	2.73
*S*15	2.90	2.80	2.97	2.96	3.26	3.37	3.52	3.66
*S*16	2.11	1.76	3.10	3.08	4.02	3.58	3.00	2.96

*R+ and R- trials of the C-100 Group are "yoked" to those in the Experimental Group.

TABLE E

SUMMARY OF MEAN LATENCIES FOR EACH S,

EXPERIMENTAL AND C-100 GROUPS

	Experimental				C-100*			
	High		Low		High		Low	
	R+	R-	R+	R-	R+	R-	R+	R-
S1	1.22	1.42	2.30	2.97	2.35	2.42	1.67	1.50
S2	2.85	2.10	.89	.81	6.67	6.60	2.02	1.97
S3	1.80	1.92	1.27	1.60	1.57	1.45	2.82	2.92
S4	2.05	1.57	1.70	1.50	1.95	2.25	.92	1.20
S5	1.10	1.15	1.82	1.67	1.32	1.45	1.47	2.00
S6	1.57	2.00	.90	.85	2.27	2.62	1.25	1.30
S7	1.35	1.27	1.37	1.25	1.02	1.02	1.72	1.65
S8	1.42	1.20	1.82	2.00	2.12	1.52	1.45	1.60
S9	1.20	1.35	1.27	2.12	1.20	.92	1.80	2.07
S10	1.20	1.17	1.20	1.12	1.60	1.40	1.80	1.60
S11	2.27	1.42	.97	1.87	1.12	1.25	1.10	1.97
S12	2.82	1.42	.70	.87	1.20	1.02	1.80	1.70
S13	1.65	1.47	1.62	1.65	1.62	1.35	1.72	1.85
S14	2.02	1.75	1.40	1.62	1.65	1.60	1.30	1.80
S15	1.20	.90	3.35	3.55	1.45	1.92	1.05	1.25
S16	4.75	3.32	1.20	1.12	1.77	1.65	2.30	2.55

*R+ and R- trials of the C-100 Group are "yoked" to those in the Experimental Group.

TABLE F

C-100 AND C-O CONTROL GROUPS, MEAN PHONATION RATES,

MEAN VERBAL RATES, AND MEAN LATENCIES

	Mean Phonation Rates				Mean Verbal Rates				Mean Latencies			
	C-100		C-O		C-100		C-O		C-100		C-O	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
S1	4.28	5.44	4.61	4.09	3.34	2.03	1.47	1.72	1.58	2.38	2.27	1.79
S2	5.06	3.77	5.30	5.26	1.91	3.18	3.62	2.76	1.99	6.63	1.34	1.74
S3	4.98	4.97	5.33	3.74	2.20	2.32	2.62	2.17	2.87	1.51	3.73	1.37
S4	4.29	4.77	4.57	5.58	3.24	2.95	2.84	2.37	1.06	2.10	1.88	1.29
S5	4.74	4.65	4.97	5.36	2.85	3.36	3.39	2.50	1.74	1.38	2.18	1.29
S6	4.56	5.60	5.04	4.92	3.38	2.98	3.07	3.16	1.28	2.44	2.38	.70
S7	4.70	4.55	4.65	5.82	3.42	3.13	2.46	1.54	1.68	1.02	1.91	3.22
S8	4.71	4.88	5.19	3.98	2.34	4.32	3.52	3.34	1.52	1.82	1.44	1.07

TABLE F--Continued

	Mean Phonation Rates				Mean Verbal Rates				Mean Latencies			
	C-100		C-0		C-100		C-0		C-100		C-0	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
S9	5.82	4.57	5.33	3.98	2.76	3.54	3.03	2.78	1.94	1.06	1.38	1.32
S10	4.44	4.52	4.27	4.43	2.97	3.29	2.73	2.30	1.70	1.50	1.30	3.00
S11	4.87	4.18	4.55	4.98	3.40	3.20	3.16	2.68	1.54	1.18	.83	1.85
S12	5.40	4.43	5.83	5.50	3.60	2.62	3.31	3.26	1.75	1.11	1.18	1.74
S13	4.32	4.26	4.32	4.84	2.87	3.57	2.01	3.03	1.78	1.48	2.74	1.35
S14	3.89	4.67	4.65	4.30	2.72	2.66	3.01	2.32	1.55	1.62	1.36	1.87
S15	4.52	5.31	4.63	4.24	3.59	3.32	2.56	2.44	1.15	1.69	1.32	1.33
S16	5.76	5.76	4.52	4.21	2.98	3.80	2.95	2.98	2.42	1.71	1.48	.85