DELAYED AUDITORY FEEDBACK AS A FUNCTION OF LEVELS OF ANXIETY

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PREFACE

A technique called "Delayed Auditory Feedback" (DAF) has recently stimulated a great deal of interest. This technique involves use of an altered type-recording device which momentarily delays a person's voice before he actually hears it relayed over earphones. Most people, in attempting to speak while under this condition, experience a "stuttering" phenomenon.

The purpose of this study is to investigate the effects of DAF used as a stressing variable. More specifically, the study is focused on ascertaining how effects induced by this type of stress vary according to sex and anxiety level of an individual.

Sincere appreciation and acknowledgment of indebtedness is extended by the author to Dr. Richard J. Rankin who served not only as a very insightful major adviser, but also as a most stimulating mentor. Indebtedness is acknowledged also to Dr. Robert Scofield and Dr. Roy Gladstone for serving as members of the advisory committee. To Dr. Harry Brobst, Director of the Oklahoma State University Testing Bureau, the author expresses thanks for the IBM scoring of numerous test materials. The author further wishes to acknowledge stimulating friendships made during this period of graduate study, and to express to his parents sincere gratitude for their support and encourgement.

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CHAPTER I

INTRODUCTION AND REVIEW OF THE LITERATURE

In 1950, Lee, using the term "Delayed Speech Feedback," introduced a relatively new and fascinating area of study. Using a multihead magnetic tape recorder to record and play back a speaker's voice so that the subject (S), wearing earphones, hears himself speaking, Lee learned that a delay of 1/4 sec. between the moment S speaks and the moment he hears himself, induced a startling disturbance of speech which may be likened to normal stuttering.

Four major effects resulting from Delayed Speech Feedback have been identified to date. They are: (a) a general slowing down of speech; (b) a noted prolongation of syllables, e.g., illuminated might become illooomminated; (c) a repetition of consonants, e.g., twittering might become twittittering; and (d) occasional complete stoppage or blocking of speech as well as the other extreme in which some Ss are not affected (Beaumont and Foss, 1957).

Advancement of research within this area, presently referred to as Delayed Auditory Feedback (DAF), has increased rapidly since 1950. Important areas of research concerning the DAF phenomenon are: (a) attempts to ascertain why some individuals experience speech difficulty when exposed to DAF while others do not (Spilka, Hanley, and Steer, 1953); (b) attempts to develop DAF for application within a clinical setting (Cherry and Sayer, 1956); and (c) the use of DAF as a "stressing"

variable in relation to human behavior (Pronka and Leith, 1957). From this last area, a problem using DAF as a stressing variable was selected.

Purpose of the Study

It is the purpose of this study to determine whether Ss with different initial anxiety levels as assessed by the Taylor Manifest Anxiety Scale (TMAS) will respond differently to DAF induced stress. Response will be measured by the IPAT 8 Parallel Form Anxiety Battery (PFAB) Form D and F, subparts labeled "Questions" and by the Heston Personal Adjustment Inventory, "Confidence Scale" (PAI).

Hypotheses

The following is hypothesized:

1. Ss will respond differently to stress as a function of anxiety level in which differential responses will be identified by:

   a. Anxious Ss under stress will have a longer reading time than low-anxious Ss under stress.

   b. More break-up, as measured by rater evaluation, will occur with the anxious Ss under stress than with the anxious Ss under non-stress, or with the low-anxious Ss under either condition.

   c. Anxious Ss, under stress, will make more situational anxiety responses as measured by the PFAB than will anxious Ss under non-stress, or with the low-anxious Ss under either condition.

   d. Confidence scores will vary as a function of anxiety level and stress condition.

A Factorial Analysis of Variance (AOV) was used to analyze the data.

Definition of Terms

The variables used in conducting the study are defined as follows:

DAF--the method by which speech is returned to the S's ears by the use of tape recording devices so as to retard momentarily the hearing of his own voice. DAF is used as the variable to induce stress.

Non-DAF--speech not altered by delaying techniques so that S hears his voice through the equipment in a normal manner.

Break-up--that speech disturbance behavior resulting from DAF stress which may be thought of as nearly synonymous with "stuttering."

Stress--a condition induced by DAF which alters behavior and results in some form of anxiety being experienced by the S.

Anxiety--a "feeling" or fear of being helpless or a fear of an unknown. Used as UI 24 (Cattell, 1957).

Review of the Literature

Effects of Delayed Auditory Feedback: Research in the area of DAF has been stimulated by Lee's (1950) writings concerning the effects of Delayed Auditory Feedback, DAF, sometimes referred to as delayed sidetone or auditory delay. A majority of the investigators who have studies of DAF report differing degrees of speech disturbance from almost normal speech to a lack of speech clarity similar to stuttering combined with the other more major forms of speech defects.

While experimenting with different delayed feedback times, Lee (1950) found variations in the verbal responses given by a number of individuals. Those who experienced difficulty produced speech effects similar to a stuttering or stammering behavior, e.g., aluminum became aluminum-num. In addition to affecting verbal responses, Lee found that DAF induced a physical response as well. Skilled telegraph-key operators, for example, performed erratically. The tapping out of "C" (-.-.) became (-...-..). It was suggested by Lee that the stuttering behavior induced by DAF is a result of S's failure to achieve proper cadence between speaking and the delayed effect.

Investigators concerned with changes in verbal behavior resulting from DAF frequently have used measurements of speech defects similar to those employed by Lee. Spilka (1954a and 1954b) employed measurements of: (a) mean vocal intensity, (b) variance of vocal intensity, (c) syllable duration, and (d) per cent of phonation time. Spilka reports that per cent phonation time and syllable duration indicate significant differences among individuals. Spilka (1954) concludes that under DAF, a lengthening of average syllable duration and a tendency for vocal intensity variations to become greater apparently occurs. Further, he reports that vocal changes under DAF seem to be related to the reading material employed.

Other investigators have used more elaborate methods of coding or classifying vocal change, referred to as "break-up," while under DAF. Korobow (1955) used: (a) intensity; (b) time; (c) rate of speech; (d) percentage of intrusions, e.g., ah's, er's, um's, etc.; (e) percentage of fractures, dismembering words; (f) percentage of word regressions, and (g) phrase regression, e.g., reiteration of phrases

or number of adjoining words. These vocal response elements, scored directly from the tape-recordings, show that the effects of DAF can be measured several ways.

Creating DAF: Typically, DAF is produced by airborne feedback through the use of a magnetic tape recorder, modified by having a movable record-head, which allows the experimenter (E) to control the time between S's vocal response, or such activity that produces sound(s), and the hearing of these sounds. The delay times used have varied between .23 to .34 sec. (Butler and Galloway, 1957) to .04 to .28 sec. (Lee, 1950).

Intensity Level or Sound Pressure Level: Intensity is usually held constant with only the duration of phrase fluctuating. The most common referent of intensity level(s) is based upon S's report rather than upon purely physical measurements.

Reading Time or Duration of Phrase: The duration of phrase refers to the time taken by the S to read the material being used, whether prose, numerals, or nonsense syllables. The most common method of measuring this variable has been a mean rate reduction score found by computing time to read the passage under a non-delayed condition minus the time to read it under a delayed condition. A free-responding situation was initiated by Korobow (1955) in that instead of reading passages from a text, Ss were asked to explain simple proverbs, thus allowing analysis of vocal intensity and word speeds that were not restricted by reading "self-controlling" written material.

Two studies (Black, 1951 and Atkinson, 1953) indicate that duration of phrase increases as a linear function of the delay time up to .18 sec. and then declines. Butler and Galloway (1957) also

report a decline between .17 and .18 sec. Others (Davidson, 1959 and Peters, 1954) have found that speeding up the rate of feedback by slowly reducing the delay time facilitates rapid speech, thus effecting a decrease in mean duration time. These studies also investigated the change in intensity of S's vocal responses. Generally speaking, DAF causes a measurable increase in vocal intensity.

Intelligibility and Articulatory Changes: Reports concerning articulatory change and intelligibility of speech are often misleading because different investigators have used a variety of criteria for measuring speech changes. The most commonly used are: (a) repetitions, (b) mispronunciations, (c) omissions, (d) substitutions, and (e) per cent of correct words (Yates, 1963). A rough linear function was found in most studies indicating that as DAF variables such as time and/or volume are increased, articulatory deviations also increase.

Since an increase in intensity level of the feedback results in a higher degree of speech disturbance, Butler and Galloway (1957) suggest that speech intelligibility may be controlled by regulating the feedback intensity level.

Most of the reported research indicates that judgment of the experimenter has been relied upon in determining degree of speech disturbance resulting from DAF. Perrin (1954) conducted a study to evaluate the differences between trained and untrained observers as to their ability in rating defective speech.

A tape-recording showing differing degrees of articulation difficulty was presented to two different groups of judges. One group consisted of persons with no training in the speech areas while the second group was composed of graduate students in the Speech field.

Perrin reported that trained and untrained judges do not differ significantly in their ratings of Ss' severity of articulation defects, indicating that even those experimenters with little training can fairly accurately categorize degree of break-up. Evaluations dealing with disturbances as a result of DAF have been based upon: (a) physical measures such as galvanic skin resistance (GSR) (Hanley, Tiffany, and Brungard, 1958), (b) experimenter judgments involving use of scales comprised of equal-appearing intervals (Lewis and Sherman, 1951), and (c) articulation disturbance as measured by overall articulatory accuracy. The latter method, employed by Fairbanks and Guttman (1958) is a system wherein evaluation of break-up is based upon number of "correct words," "correct word rate," number of "substitutions," "omissions," and "additions."

Adaptation and DAF: The term "adaptation" used in relation to DAF usually refers to two aspects of adjustment: (a) the extent to which S adjusts to the effects of DAF while reading under DAF influence and (b) the time lapse between termination of DAF and S's recovery of normal speech. Tiffany and Hanley (1956) reported that within single series readings, the adaptation effect is very slight. Using measures of "reading rate adaptation" and "fluency adaptation" they found that some Ss learned to overcome or avoid "stuttering" but they could not overcome or control reading rate. Beaumont and Foss (1957) report a correlation (r) of .83 between initial and re-test reading times under DAF of nine Ss reading different passages equivalent in length and difficulty, with a two-week interval between readings.

Confounding Variables: An insightful discussion is presented by Yates (1963) pertaining to the problems of control awaiting the unaware E.

An area of concern noted is that of the reading materials given the S. Yates points out that if the same S is to be used while experiencing both DAF and non-DAF the material must be balanced both in content and in structure. Spilka (1954b) found a significant relationship between length of reading passage and the delay time for average syllable duration. He also reports significant relationships between passage length and vocal intensity.

Sound Pressure Level: A difficult problem to resolve concerns sound pressure level at S's ear, should sound pressure be held constant or allowed to vary according to fluctuation in S's vocal response? Since DAF increases the S's intensity of speech response, a vicious cycle develops. Butler and Galloway (1957) have pointed out that loudness in itself does not affect speed of reading, however, it does affect speech intelligibility.

Pre-training: A few instances are reported in which S was allowed opportunity for pre-training or pre-experience in the experimental interaction which was to follow. Several experimenters permitted familiarization with the material to be read, but few allowed pre-awareness with the equipment to be used. Tiffany and Hanley (1952) granted Ss five minutes to acquaint themselves with the passage to be read before entering into the test situation. Butler and Galloway (1957) let Ss familiarize themselves with the locations where numbers would appear on different dials.

Pronko and Leith (1956) used three experimental conditions to ascertain the effect of pre-experience. In their investigation Ss were required to synchronize manipulation of switches while reading aloud instructions telling them how to do so. One group of Ss were

given an opportunity to practice the proper responses in advance whereas those in the remaining two conditions were not. The pre-practice group performed the experimental task better than the other two groups.

Instructions for Rate of Reading: Reading rate of Ss under the influence of DAF has been found to remain constant with relatively short reading materials so long as feedback rate and feedback delay are not varied. Ten 200-word passages of equal difficulty were read successively by Ss with no prolongation of reading time being reported (Gibbons, Winchester, and Krees, 1958). Peters (1954) deliberately varied instructions asking Ss on separate occasions to read at a natural rate and at a maximal rate. As found in most studies, as the rate of feedback increased, the reading rate also increased, indicating a speedup effect. Tiffany and Hanley (1956) instructed Ss that their task was to maintain a normal reading pattern, regardless of what they heard in their earphones. Again, Ss were unable to sustain a "normal" reading rate.

Noisy Background: Butler and Galloway (1957) found that different DAF effects are not a result of background noise alone. Significant effects relative to speech errors were found to be a function of both delay time and increased intensity; the longer the delay and greater the intensity of feedback, the greater the speech error. The investigators point out that this supports the Tiffany and Hanley (1952) findings that increased intensity tends to generate severe break-up. Peters (1956) required Air Force cadet Ss to read standardized intelligibility lists while simultaneously hearing acoustical signals common to conditions under which Ss might normally operate. Each speaker read two lists while hearing common signals such as: (a) the same words, (b) similar

words which might be easily confused with the words he was reading, (c) unrelated words, (d) nonsense words, (e) meaningful "flight-patter" phrases; e.g., pilot "chatter," and (f) "babble" which was produced by overlapping a number of "flight-patter" phrases. The S for example, would read: "Number one warm campus port," while simultaneously hearing the E reading "Number one swarm canvas quart." The intelligibility of speech was scored by two panels of judges comprised of from 12 to 15 members. One panel heard S's voice after it had been "limited," i.e., electronically held constant irrespective of S's voice change. The second panel heard S's voice without "limiting." The judges were simultaneously exposed to 114 dbs of free-field, simulated propeller-type aircraft noise. Differences in mean per cent intelligibility scores among acoustic signal conditions, i.e., same words, similar words, unrelated words, etc., were significant beyond the five per cent level when S's voice signal was subject to "limiting" and significant beyond the one per cent level when S's voice signal was not modified by "limiting." Furthermore, Ss were more intelligible when reading under the condition of nonsense words, "flight-patter," and "babble" than when reading under conditions of the same word or words unrelated to what they were saying. These findings suggest that the effect on the intelligibility of a speaker who is simultaneously hearing acoustic signals is relatively independent of fluctuations in the sound pressure level of the signal. In other words, the critical factor is what the speaker hears, not how he hears it.

Individual Difference: One of the unanswered questions raised by DAF pertains to individual differences in relation to the degree of break-up each S experiences. While under the influence of DAF some

Ss show no disturbance while others are nearly totally incapacited. The majority of Ss fall within the mid-range between the two extremes. Most of the data concerning individual differences relate DAF behavior to personality factors.

Personality and DAF: In one of the few investigations dealing with individual differences per se, Beaumont and Foss (1957) found four major DAF effects on speech in normal Ss: (a) a general slowing down of speech, (b) a prolongation of syllables, (c) a repetition of consonants, and (d) occasional complete stops or blocking. Two hypotheses were postulated that Ss might use DAF in a novel way thus overcoming it or that DAF induced speech disturbance may be related to perseveration. Tests used in measuring the identifying personality variables were: star tracing, mirror writing, Einstellung test (Luchins water jars), and Imagery Rigidity tests. Beaumont and Foss concluded that, of the personality variables investigated, perseveration appears to be most closely related to speech behavior induced by DAF. Spilka, Hanley and Steer (1953), using a battery of personality tests in two studies investigated the relationships between personality variables and speech intelligibility in a DAF-type situation. They report conflicting results in the two studies. The discrepancies in the results of these two studies were considered by the investigators to be a reflection of the nature of the personality tests. The tests were among the best available but were still subject to the vagaries of personality measurement. The authors also advance the possibilities that the findings were affected by a chance sampling or that speaking intelligibility and personality are so closely related, a slight change in one brought about for example by DAF, might effect a great change in the other.

In a later study, Spilka (1954) further explored Cutler's (1951) finding that Ss under stress induced by DAF differed in reporting a need to concentrate on or "feel" their speech in order to avoid break-up. In other words, to effect maximum adjustment, S must be aware, in varying degrees, of both external and internal cues. Spilka approached his investigation by giving attention to external and internal cues and the ability of S to maintain his attention under changing conditions.

Korobow (1955) investigated the hypotheses that: (a) different degrees of psychological stress can be induced and the degree of stress can be controlled through use of variable auditory feedback delays, and (b) the interpretation of and reaction to this stress is a function of the way in which it is perceived and of the personality traits of the individual S. All Ss in Korobow's study were tested with introspective rating scales to assess different personality traits both before and after experiencing DAF. An example of test items used within these scales are: "I feel ill at ease, "I feel aggressive," and "I felt like walking out," "I felt angry." While experiencing DAF, Ss were given seventeen simple proverbs, such as: "Don't cry over spilled milk" as a standard verbal task. The vocal response variables were: (a) time utilized in making each verbal response, (b) rate of speech, (c) intensity, (d) percentage of word endings omitted, (e) percentage of words omitted, (f) word fractures, (g) word regressions, and (h) phrase regression. Korobow's results show that Ss who expressed a "need to control their feelings" showed a tendency to increase vocal intensity." Ss who perceived DAF as a challenge attempted to overcome the stress by forceful and persistent

activity. These Ss spoke louder and longer than those who judged DAF as a threat. Those threatened tended to withdraw from the stress by speaking very softly and briefly. They reported feeling stupid and/or experiencing difficulty in thinking under DAF stress. These Ss also indicated they were not responsible for their difficulty in speaking and thus experienced very little need for maintaining a high level of speech precision. Personalities characterized by "seclusiveness" and "secretiveness" exhibited fractures of speech, i.e., words being dismembered by stressing each syllable of the word or the stretching or slurring of words. Korobow concluded that specific behavior of Ss under stress is determined by three aspects: (a) the objective problem, (b) S's subjective interpretation of the situation, and (c) the organization of his personality traits. He postulates that stress activates secondary goals which then become relatively important determinants of behavior. It also brings about a reorganization of behavior which has been oriented toward primary goals. Whether stress induces efficient or inefficient behavior is dependent not only upon the problem and the individual personality, but also upon whether the behavioral tendencies are congruent with or in conflict with each other or with primary goals.

Pronko and Leith (1956) presented a study concerning the disintegration of S's behavior while under DAF induced stress. Three groups of Ss, referred to as: (a) "sink or swim" group, (b) "planted-leader" group, and (c) "response-prepared-in-advance" group, were exposed under DAF to three conditions comparable to "real life" emergency situations and representing different levels of stress. In the first, the "sink or swim" condition, no warning, help, or previously acquired response was

available to the individual S. In the second, "planted-leader" condition, E pointed out the proper responses to be made. The third "response-prepared-in-advance" group were allowed a "run-through" trial of the manual operations soon to be performed but without DAF. Under each condition, Ss were to perform a complex manipulative task while simultaneously reading aloud instructions which told him what to do. The stress of each condition was intensified by threat of an electrical shock should S fail to perform the task according to instructions. Results indicate that the "sink or swim" group, thrown suddenly into a stress situation without warning, showed marked difficulty in their ability to make the appropriate responses. A "freezing" behavior in which Ss stopped performing the required responses without being aware they had stopped was displayed by some Ss in this group, whereas, such behavior was not observed in the other two groups. The performance of the group having a "planted-leader" showed marked ability above that of the "sink or swim" group, but the group having a "response-prepared-in-advance" showed the highest performance rate of the three conditions.

Stress: Pronko and Leith (1956) report that between 1936 and 1940 no "stress" studies were to be found in the Abstracts; between 1941 and 1945 eight were found; and between 1951 and 1955, 207 were listed.

In an informative presentation of a neurophysiological hypothesis of behavior under stress, Schaffer (1954) describes a stressful situation as one in which a major disruption takes place in the interaction between the organism and its environmental setting. A disruption may also be created when a highly motivated organism is unable to effect an adjustment toward an unsolvable problem. This

can occur under conditions described as trauma, frustration, and conflict. It has been found in most cases, according to Schaffer, that behavior under stress is altered both in rate and range of its general activity.

Anxiety: Increasing emphasis has been given to the assessment of anxiety following the development of the Taylor Manifest Anxiety Scale (TMAS) from the Minnesota Multiphasic Personality Inventory (MMPI) (Taylor, 1953). Approximately 200 items were drawn from the MMPI by Taylor, and were submitted to five clinicians for judgment as to the ability of each item to indicate manifest anxiety. Following several modifications, 50 items were selected. Taylor states that a comparison of male and female scores indicated that females had a somewhat higher mean anxiety score than males but the difference was not significant. Different populations had similar distributions of scores on the anxiety test and the quartile scores also were in close agreement. Consistency of scores, using the test re-test method over five months, showed no systematic change upward or downward in regard to relative positions of individuals in the group. Absolute scores remained constant. The scale was revised further to give greater clarity. Statistical tools were employed to ensure that a high degree of correlation was maintained between the original and the revised items. The TMAS scores of 1,971 university students used as a standardization group yielded a median score of approximately 13, whereas anxiety scores for 103 neurotic and psychotic individuals taken from both an in- and an out-patient population resulted in a median score of approximately 34.

A later study by Taylor (1955) which assessed the relationship between intelligence and manifest anxiety concluded that little or no

relationship exists between IQ and anxiety. The study pointed out, however, that the more intelligent individuals, especially on a true-false version of the anxiety scale, are better able to "outguess" the scale and thus alter results by placing themselves in a better light. It is further pointed out that a forced-choice scale eliminates this kind of distortion, thus reducing the correlation between IQ and anxiety. A factor analysis of items representing anxiety (Martin, 1959) indicates that intelligence may be ruled out as one explanation of the anxiety dimension. Rankin (1965), however, using a battery of tests,[1] on 1,100 undergraduate students in psychology, at Oklahoma State University, found that "With certain tests, most notably those with a verbal emphasis, there is a significant negative relationship between TMAS and IQ for males and females when test difficulty is appropriate for the group" (p. 185). He concludes that test difficulty levels should be taken into consideration when assessing IQ-anxiety relationships.

Sarason (1960) points to what he calls "a habit interpretation of anxiety" which in effect says that Ss differ in their responses to a threatening situation yielding either a high or low anxiety reaction. A low scoring S may react by directing his attention to the problem, but the high scoring S may react to the threat with actions that are self-oriented or personalized. Sarason points out that what is measured by the different scales of anxiety is "...the extent to which an individual is willing to admit to experiencing anxiety in certain

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[1]Tests used were: Hermon-Nelson 1961 Tests of Mental Ability, Revised Minnesota Paper Form Board Test, verbal tests, the K and L scales of the MMPI, and the TMAS.

situations" (p. 409). Sarason also points out that high anxiety scores might be the result of: (a) Ss labeling themselves with "bad" self-attributed characteristics as a method of getting ego-support from others, (b) Ss being open and frank, and (c) Ss that are highly perspicacious of their own reactions. It is concluded by Sarason that high-anxious Ss when perceiving a threat condition in their environment will emit personalized, self-oriented responses that are often detrimental to themselves.

High-anxious Ss are found to be more productive than low-anxious Ss. Westrope (1953) found significantly higher productivity by high-anxious Ss on the Rorschach test. High-anxious Ss also show shorter latencies in simple reaction time tasks (Benton, et al., 1955). The authors propose the possibility that high-anxious Ss initially start with a faster rate of verbal utterance, but as they continue with the spoken sentence, a slower rate is maintained.

Taffel (1955) reported a study wherein Taylor found that high-anxious Ss were superior in amount of eyelid conditioning throughout conditioning trials. This finding was reconfirmed by Spence and Taylor (1951) who, in another study, hypothesized that TMAS could be applied to a study of verbal behavior, i.e., verbal responses can be operantly conditioned as a function of reinforcement and as a function of anxiety level as assessed by the TMAS. Results indicate (Taylor, 1953) that there is a relationship between amount of conditioning and anxiety level.

Summary

Meaningful application of DAF is still relatively unexplored. The questions, why are there significant differences between individuals

under a DAF condition in relation to degree of break-up? why do some individuals show little or no break-up at all? and finally, what causes break-up? are yet to be answered.

Fairbanks (1954) attributes the failure of scientists to answer the questions raised above as well as the limited amount of knowledge regarding effective application of DAF to the fact that, as yet, the entire speech system and the interrelationships between the physical speech mechanism and mental processes are not completely understood. The speech model he offers as an explanation for speech disturbances may provide insights into the relationship between DAF and break-up.

Application in a clinical setting of DAF as a technique for diagnosing and treating speech pathological problems has been reported by Cherry and Sayer (1956). The application of DAF as a means of experimentally inducing a stress somewhat comparable to that experienced in real life so that man's behavior under stress and his adjustment to stress can be scientifically observed is not limited to the speech area. Lee (1950) and Pronko and Leith (1956) have demonstrated use of DAF in observing the behaviors of Ss executing a manipulative task while under stress.

Investigation of the effects induced by DAF has been extended recently into areas concerning personality (Spilka, 1954; Korobow, 1955); individual differences (Beaumont and Foss, 1957); psychological stress (Pronko and Leith, 1956); speech pathology, including auditory malingering (Tiffany and Hanley, 1952); and theories of speech (Fairbanks, 1954).

CHAPTER II

METHOD

The method consists of administering to Ss a verbal personality inventory consisting of the "Questions" parts of the D and F scales from the Cattell IPAT PFAB, the Heston "Confidence" Scale, and the MMPI Lie Scale under delayed auditory feedback and to other Ss the same inventory under normal feedback. These Ss consisted of previously selected high, medium and low anxious Ss analyzed separately as to sex and anxiety level. Time to read the inventory and amount of break-up were analyzed and recorded by the E.

Measures

Selection of Ss Battery: A test battery made up of the TMAS, the MMPI Lie Scale, and the vocabulary test of the Educational Testing Service Cognitive Factors Battery (1963) was administered to 1,000 students in the basic S pool. This battery is part of the ongoing research at Oklahoma State University and the scales used are found to be sensitive and reliable with Oklahoma State University students (Rankin, 1965).

Measures Used to Analyze Stress Reaction Under DAF: The chief criterion used in selecting scales was their applicability to verbal administration and a sensitivity to transient anxiety levels. The PFAB meets these requirements and has been shown to measure anxiety

(Cattell, 1960). A special problem with scales to be used under the stress condition is that the inventory must be amenable to oral response by Ss and must contain a measure of anxiety related to but independent from the TMAS used to select Ss for initial anxiety levels.

The PFAB is designed to be sensitive to situational anxiety and is reported to load on the same factorial dimension as does the TMAS. This scale is not designed for oral administration so it is apparent that such presentation poses a problem which may be evaluated in the light of the history of personality inventories. A review of the history of inventories reveals that they were based upon psychiatric interview questions. Guilford (1959) points out that inventories should be regarded as a form of an interview. Thus, most inventory items have a verbal origin.

A pilot study was first conducted in which DAF served as the stress inducing variable. Two forms of the PFAB (Cattell, 1960) were used in the preliminary assessment of anxiety. Ss were 24 undergraduate students of which one-half responded to the above battery under normal conditions or non-DAF, while the remaining one-half responded to the battery while under DAF. No significant differences were found between the scores obtained under the two conditions. As a result of the pilot study and findings by Rankin (unpublished study, Oklahoma State University, 1964) which indicated that 24 minutes of exposure to DAF is the limit a volunteer S should tolerate, shortened forms of the final test battery was indicated. Tests chosen for the final experiment were: the subparts of the PFAB, Forms D and F, labeled "Questions," "Confidence Scale," the MMPI Lie Scale, and the TMAS.

The PFAB consists of 8 parallel forms made up of five subparts. Each subpart is labeled following the Cattell Universal Index Code. From Forms D and F, the subparts labeled "Questions" were chosen. These question items such as "I sometimes feel compelled to count things for no particular purpose" are in a face validity sense related to the TMAS type of item. This "Question" subscale loads quite heavily (.68) on anxiety UI 24 as it is presented in Cattell's Index. Cattell states, "that the purpose of these tests is to facilitate anxiety fluctuation research which has not been possible before" (Cattell, 1960). By combining the most reliable and most anxiety "loaded" subscales from two of the 8 PFAB forms, it was hoped that chances for sensitivity would be increased. More subparts or more forms could be added but this would push the reading time beyond the tolerance limits set for Ss.

The Heston PAI was selected because various studies reveal "...the split half reliabilities of the individual scales are reasonably satisfactory, ranging from .80 to .91," while "...Validity is claimed on three grounds: (a) Internal Consistency...(b) Psychological Meaningfulness...and (c) Independent Criteria..." (Eysenck, 1953, p. 98). The PAI contains six subparts; analytic thinking, sociability, emotional stability, confidence, personal relations, and home satisfaction. Based upon the statistical evidence referred to above and Kelly's (1953) evidence indicating "...corrected split half reliability coefficients of .84 for the confidence scale, with an intercorrelation of .61..." (p. 99) the 40-item confidence subscale was included in the final instrument to give greater depth and internal consistency checks toward the overall composite "Verbal Inventory Scale." According to Ellis

(1953), "...The only truly important personality traits...measured... (by the Heston PAI) are confidence and emotional stability" (p. 98).

The MMPI Lie Scale was chosen in order to obtain a measure of both "face validity" and "measured validity" as well as to serve as an experimental variable. The MMPI Lie Scale is made up of 15 items, established through standardization methods, and validated through analysis of responses given by normal and abnormal Ss. A high lie score indicates that the individual is attempting to place himself in a favorable light or he is misrepresenting himself (Freeman, 1962). The lie scale was used in the initial testing battery administered to more than 1,000 student Ss. This allowed further statistical analysis of scores. The Taylor Manifest Anxiety scale, discussed in detail in the review of literature, was selected as a measure of anxiety level on the basis of its being an established research tool used in research with anxiety.

Subjects

One thousand Oklahoma State University undergraduate students enrolled in 25 sections of Introductory Psychology comprised the basic S pool. The major part of the group were of Freshman and Sophomore standing. From the above pool, 144 Ss were selected on the basis of their TMAS scores. These 144 Ss were classified into three groups representing different levels of anxiety. The first level was comprised of Ss with scores of 30 and above; the second level of Ss with scores between 13 and 16; and the third level of Ss with a score of 10 or lower. These levels were used in order to allow comparability with various other studies (Rankin, 1965). Lie scores

were noted and any Ss having a lie score of seven or above was eliminated and another S from the same score level was selected.

Factorial Design

A factorial plan was utilized in which there were two levels of sex (the A level), two levels of condition, either delay or non-delay (the B level), and three levels of anxiety representing high, medium, and low groups (the C level). Such a design produces 12 cells and 12 Ss were provided for each cell.

Equipment

A Bell and Howell tape recorder, Model #775A, modified by the Lafayette Instrument Company was utilized. For the purpose of eliminating qualitive sound differences between DAF/non-DAF conditions a low impedance power amplifier, Model #PA 420, also by Lafayette, was added to the DAF channel. Speech was picked-up using an Electro-Voice 644 Dynamic microphone mounted eight to twelve inches in front of the Ss. Speech was returned to Ss through a Koss SP 3x headset of 8 ohms nominal impedance. In both DAF and non-DAF conditions hand monitoring kept the voice average at 52 db above background. In the DAF condition sound was returned to the Ss with a delay time of .27 sec.

Procedure

Ss were exposed individually to the experimental conditions in a small "soundproof" room, 8 x 8 feet in size. The S was seated in the larger of two chairs while the E sat in a second chair facing S.

In a friendly, conversational tone, E obtained information regarding S's name, year in school, age, date of birth, major, and if S had had previous experience with DAF. The explanation given the group exposed to DAF was as follows:

> Instructions: This is a study in the area of delayed auditory feedback, which merely means that as you speak or read, your voice will come back to you, only it is momentarily delayed. This bothers some people, others are not bothered at all. I have a scale (E handed 'Verbal Information Scale' to S--see Appendix) I would like you to read. There are 77 items in it and there are no embarrassing questions. It usually takes less than 15 minutes to read.

The S was asked to read each of the questions aloud, but to read aloud only the answer which applied to himself. He also was told, "You don't have to sit and think over your answer, the first one that comes to your mind is fine."

Instructions for the group exposed to the non-DAF or no stress condition were approximately the same, except terminology referring to DAF was altered to read "auditory feedback." S was told, "You will hear your voice coming back through the earphones..." Each S was asked if he/she had any questions. If not, E explained that he would go into an adjoining room containing the equipment. The earphones were adjusted to fit S. At this time the earphone-lead-in-wire was firmly attached to the back of the chair forcing S to maintain a fixed distance in relation to the microphones eight to twelve inches away. E stated, "We will communicate via the microphones and earphones from now on." A door was shut, thus isolating S. Before continuing with the experiment a check was made with each S to ascertain if he/she could hear E. If so, S was requested to begin reading the scale, starting with item number one. At this time, the feedback apparatus was activated

and a stop watch started simultaneously with S's first word. Following each reply by S, the answer was recorded by E on an IBM answer sheet. Throughout S's reading, degree of speech break-up was assessed and rated on a seven point scale as follows:

1. No break-up
2. None to light break-up
3. Light break-up
4. Light to medium break-up
5. Medium break-up
6. Medium to heavy break-up
7. Heavy break-up

Following completion of each S's reading of the 77-item scale, total reading time was recorded and the feedback system deactivated. The S was informed through the speaker system that E would remove the earphones and help S out of the room. If time permitted, questions brought up by Ss were answered in a broad, general manner. All Ss were asked not to discuss the experimental session until their psychology instructor reported basic findings sometime near the end of the semester. In almost all cases, rapport was excellent. Most Ss expressed a desire to return if needed.

CHAPTER III

RESULTS AND DISCUSSION

The results will be presented for each variable separately. Two of the variables, time score and break-up, are typical variables used in DAF studies and are presented with two purposes. First, to show that the apparatus did produce the delay effect, and second, to determine if initial anxiety level as assessed by the selection TMAS is in any way associated with DAF response. The second set of variables, the Cattell PFAB and Heston C score are analyzed in attempts to determine if stress, assumed to be induced by DAF, is reflected in the scores of the groups under DAF.

Time Variable: This analysis involves the total amount of time S requires to read the inventory. A lengthened time indicates that the S is responding to the DAF or stressing variable. In AOV Table I, Reading Time, the important consideration is the "B" or condition effect. The difference in seconds in reading time between experimental and control conditions was significant at the .005 level with those under delay requiring a mean time of 601.86 sec. while those under normal delay required a mean time of 554.43 sec. This reading time analysis is consistant with most research using DAF, and without significance for the condition effects there would be no evidence, either direct or indirect, of any stress response in S, consequently without this effect there would be no study. Further analysis reveals

TABLE I

ANALYSIS OF VARIANCE AND MEANS TABLE REPRESENTING "READING TIME"

EXP. VAR.	SS	df	MSS	f	LEVEL OF SIG.
A - Sex	48,951.56	1	48,951.56	5.36	.02
B - Cond.	80,987.67	1	80,987.67	8.87	.005
C - Anx.	17,236.17	2	8,618.09	n.s.	---
AB - Sex-Cond.	3.06	1	3.06	n.s.	---
AC - Sex-Anx.	22,090.50	2	11,045.25	n.s.	---
BC - Cond.-Anx.	18,104.39	2	9,052.20	n.s.	---
ABC - Sex-Cond.-Anx.	686.00	2	343.00	n.s.	---
Within	1,195,207.65	132	9,130.36	---	---
Total	1,393,267.00	143	9,743.12	---	---

MEANS

(Time as expressed in seconds)

Sex	Condition DAF	Condition Non-DAF	$\bar{M}$ Anxiety Level
	601.86	554.43	
	Hi 586.29	Hi 571.50	Hi 579.21
Male 596.58	Mid 626.00	Mid 572.58	Mid 599.29
	Low 648.42	Low 574.08	Low 611.25
	Hi 561.67	Hi 544.50	Hi 553.08
Female 559.71	Mid 617.00	Mid 554.83	Mid 585.92
	Low 571.17	Low 509.08	Low 540.13

a difference in mean reading time between the males and the females significant at the .05 level with the females requiring less time to read the inventory.

Break-up: Following Perrin, 1954, it was deemed adequate for the E to rate Ss as to amount of break-up. In this analysis, the important consideration is the "C," or anxiety effect and the "CB" or condition x anxiety interaction. As expected (see Table II), break-up effect was found, under the delay condition, significant at the .0005 level with a mean break-up score of 2.54 on a 7-point scale varying from high break-up to normal speech and with a mean of 1.06 for the normal condition. There is no anxiety effect; all levels of anxiety broke up about the same amount and there is no anxiety under condition effect which would have indicated that high-anxious Ss respond to delay more than low-anxious Ss.

Cattell Situational Anxiety Scale (PFAB): The D plus F questions summed together were given under oral conditions. The highly significant "C" or anxiety effect indicates that Ss of low anxiety on the TMAS have low scores on the verbally administered PFAB D plus F scales. This is to be expected, since a correlation of approximately .60 has been independently obtained between D plus F and the TMAS. The most pertinent value in Table III involves the "B" or condition effect, which shows no significant difference between the scores of Ss under delay, or stress, and Ss not under delay. This is of interest considering that the Cattell scales are designed to be sensitive to situational anxiety. One can conclude that either responding under delay does not increase stress, or anxiety, or that the Cattell scale is not sensitive to stress. The author tends to the latter conclusion

TABLE II

ANALYSIS OF VARIANCE AND MEANS TABLE REPRESENTING "BREAK-UP"

EXP. VAR.	SS	df	MSS	f	LEVEL OF SIG.
A - Sex	1.17	1	1.17	n.s.	---
B - Condition	79.51	1	79.51	60.23	.0005
C - Anxiety	.18	2	.09	n.s.	---
AB - Sex-Cond.	.56	1	.56	n.s.	---
AC - Sex-Anx.	8.51	2	4.26	3.23	.05
BC - Cond.-Anx.	1.85	2	.93	n.s.	---
ABC - Sex-Cond.-Anx.	10.79	2	5.40	4.09	.025
Within	174.58	132	1.32		
Total	277.16	143	1.94		

BREAK-UP

	Condition		
Sex	DAF	Non-DAF	Anxiety Level
	2.54	1.06	
	Hi	Hi	Hi
	1.92	1.25	1.58
Male	Mid	Mid	Mid
1.89	3.50	1.00	2.25
	Low	Low	Low
	2.67	1.00	1.83
	Hi	Hi	Hi
	2.75	1.08	1.92
Female	Mid	Mid	Mid
1.71	1.83	1.00	1.42
	Low	Low	Low
	2.58	1.00	1.79

TABLE III

ANALYSIS OF VARIANCE AND MEANS TABLE REPRESENTING "D+F SCALES"

EXP. VAR.	SS	df	MSS	f	LEVEL OF SIG.
A - Sex	5.84	1	5.84	1.23	n.s.
B - Cond.	1.17	1	1.17	n.s.	---
C - Anx.	533.29	2	266.65	56.13	.0005
AB - Sex-Cond.	12.84	1	12.84	2.70	---
AC - Sex-Anx.	14.68	2	7.34	1.54	---
BC - Cond.-Anx.	3.01	2	1.51	n.s.	---
ABC - Sex-Cond.-Anx.	3.01	2	1.51	n.s.	---
Within	626.60	132	4.75	---	---
Total	1,200.44	143	8.39	---	---

MEANS

(D+F Scale)

	Condition		
Sex	DAF	Non-DAF	Anxiety Level
	5.64	5.82	
	Hi	Hi	Hi
	9.08	7.92	8.50
Male	Mid	Mid	Mid
5.93	5.67	5.50	5.58
	Low	Low	Low
	3.67	3.75	3.71
	Hi	Hi	Hi
	7.83	8.67	8.25
Female	Mid	Mid	Mid
5.53	4.08	4.58	4.33
	Low	Low	Low
	3.50	4.50	4.00

since other variables such as the time score indicate the effectiveness of the situation, and the verbal reports of Ss indicate that delayed feedback produces anxiety. Some Ss required assurance that their responses were normal and not indicative of neurosis, psychosis, or other maladjustments.

Possibly the lack of difference between the experimental and control group, that is delay vs. non-DAF, in Cattell D plus F response is caused by reliability problems. Even though each group is tested once when comparisons are made between groups, the reliability of a series of difference scores tends to be far lower than the reliability of any independent score. It is suggested that scales designed for the purpose proposed by Cattell need extremely high reliabilities which are as yet unobtained.

Lie Scores: Lying, a response style variable, becomes important in two ways. First, does more lying occur under the stressing condition than under the normal condition? Second, does more lying occur when tests are presented verbally than when they are presented using paper and pencil. The first questions are answered in Table V of the AOV showing that females exhibited a higher amount of lying than the males and that there is significantly more lying in the low anxious groups than in the high anxious groups. This latter finding is not surprising in light of Edwards' (1953) comments on social desirability. The most intriguing point could have been an increase in lying under DAF or stress; such a result did not occur.

The second consideration in regard to lying concerns the possibility that taking a test with E listening, increases lying and reduces the validity of associated personality measures given verbally.

To test this, a small control group consisting of an Introductory Psychology section was presented the MMPI Lie Scale twice, and their changes in lie scores compared with the lie scores of the experimental group which had been given the MMPI Lie Scale written in their selection sections and verbally in the experiment. In Table VI it is shown that the experimental group has a mean lie score of 3.47 when the scale is given conventionally, which drops to 2.76 when the same scale is part of the oral inventory. This drop is significant at the .001 level. The control group shows that under normal administration, there is no difference between lie scores, when the lie scale is presented twice. While the above is not direct evidence of the validity of oral presentation of inventories, it at least shows that lying does not increase. The above should be interpreted with caution, since the experimental group was stratified by anxiety level, whereas the control group was of a random selection. Further work concerning verbal administration of inventories is called for.

Heston PAI Confidence Scores: Table IV shows that the Heston scores vary in relation to initial anxiety level with the high-anxious group having the lower confidence score. This difference is found to be significant at the .0005 level. A relationship between anxiety and confidence, while not surprising, has not been reported before, and is worthy of consideration.

The major interest in confidence in this study involves the "B_2" or condition effect, and "BxC_2" condition x anxiety effect. It was hypothesized that the groups would tend to show lower confidence under DAF, or stress. The hypothesis was not supported.

TABLE IV

ANALYSIS OF VARIANCE AND MEANS TABLE REPRESENTING HESTON'S CONFIDENCE SCALE

EXP. VAR.	SS	df	MSS	f	LEVEL OF SIG.
A - Sex	17.36	1	17.36	n.s.	---
B - Cond.	38.03	1	38.03	n.s.	---
C - Anx.	5,907.68	2	2,953.84	102.80	.0005
AB - Sex-Cond.	136.11	1	136.11	4.74	.05
AC - Sex-Anx.	11.01	2	5.51	n.s.	---
BC - Cond.-Anx.	82.51	2	41.26	n.s.	---
ABC - Sex-Cond.-Anx.	73.35	2	36.68	n.s.	---
Within	3,792.84	132	28.73	---	---
Total	10,058.89	143		---	---

HESTON CONFIDENCE SCALE

	Condition		
Sex	DAF	Non-DAF	Anxiety Level
	20.21	21.24	
	Hi	Hi	Hi
	11.67	14.33	13.00
Male	Mid	Mid	Mid
21.07	19.00	25.42	22.21
	Low	Low	Low
	28.08	27.92	28.00
	Hi	Hi	Hi
	12.83	10.25	11.54
Female	Mid	Mid	Mid
20.38	22.08	22.00	22.04
	Low	Low	Low
	27.58	27.50	27.54

TABLE V

ANALYSIS OF VARIANCE AND MEANS TABLE REPRESENTING "VERBAL LIE"

EXP. VAR.	SS	df	MSS	f	LEVEL OF SIG.
A - Sex	42.25	1	42.25	14.04	.0005
B - Cond.	1.78	1	1.78	n.s.	---
C - Anx.	35.68	2	17.84	5.92	.005
AB - Sex-Cond.	0.00	1	0.00	n.s.	---
AC - Sex-Anx.	1.54	2	.77	n.s.	---
BC - Cond.-Anx.	3.60	2	1.80	n.s.	---
ABC - Sex-Cond.-Anx.	1.79	2	.90	n.s.	---
Within	397.84	132	3.01	---	---
Total	483.97	143	3.38	---	---

MEANS

(Verbal Lie Scale)

	Condition		
Sex	DAF	Non-DAF	Anxiety Level
	2.65	2.88	
	Hi	Hi	Hi
	1.75	1.58	1.67
	Mid	Mid	Mid
Male	2.33	2.58	2.46
2.2	Low	Low	Low
	2.25	2.83	2.54
	Hi	Hi	Hi
	2.58	2.33	2.46
	Mid	Mid	Mid
Female	3.25	4.08	3.67
3.3	Low	Low	Low
	3.75	3.83	3.79

TABLE VI

THE IMPACT OF VERBAL PRESENTATION OF THE MMPI LIE SCALE ON SCORES OF TWICE TESTED SUBJECTS

		Presentation I	Presentation II	Diff.	T	Sig.
Control (n=49)	M	2.78	2.86	+.08	.63	n.s.
	SD	2.05	2.08	.80		
Exp. (n=144)	M	3.47	2.76*	-.71	5.33	.001
	SD	.96	1.28	1.59		

*This test was given orally.

General Discussion

In overview, the findings indicated that several parts of the inventory, given verbally, seemed to be related to the TMAS. The Cattell Scale, the Heston Scale and the MMPI Lie Scale are related in a traditional and predictable manner to the TMAS. Secondly, we find that the DAF has a traditional and predictable effect upon time to read (reading time) and break-up. We do not find that anxiety is associated with break-up or that anxiety responds under stress, as associated with DAF. Apparently, anxiety is not a determiner of whether or not a person breaks up and responds to DAF, and apparently some scales supposedly sensitive to stress, do not respond to stress.

The major contribution to scientific progress of personality measurement would seem to be that certain scales can be given verbally without increasing lying. This was not an objective of the study, but would certainly seem a useful by-product for future work. The author suggests that a similar study be conducted utilizing extremely reliable anxiety measures composed of all the question parts of the Cattell, or perhaps two or three of the Cattell forms blended together.

Much more work is needed in this area and it is the hope of the author that some clues or leads as to what to do or not to do may be gathered from this study.

CHAPTER IV

SUMMARY AND CONCLUSION

The review of literature presented a number of studies concerning delayed speech feedback (DAF) and its effects upon speech behavior. Studies have been focused upon attempts to discover which DAF factors produce an effect as well as searching for individual characteristics of the individual S, which affect the results of DAF. Some factors related to the DAF variable are: delay time, level of intensity, and pre-experience. These variables affect speech behaviors in terms of speed of speaking, prolongation of syllables, repetitions of consonants, blocking, and other speech behaviors that are comparable to stuttering. In several of these studies DAF was employed as a stressing variable.

The problem concerned the impact of stress as produced by DAF upon anxiety scales supposedly sensitive to stress. Secondly, E was interested in whether or not Ss measured as high-anxious would perform differently under stress than under non-stress. It was expected that high-anxious Ss would take longer to read the inventory under stress, indicating more sensitivity to DAF. Further it was expected that high-anxious groups would make more anxious responses when "threatened" by a stressing situation such as DAF than would a group of similarly high-anxious level Ss under a not so stressing or threatening situation. It was finally hypothesized that anxiety level is related to break-up under DAF.

One hundred and forty-four Ss were classified according to three levels of anxiety as assessed by the TMAS. After selection by sex and anxiety scores, Ss were placed in either a stress or non-stress condition induced by DAF or non-DAF. While under one of the above experimental conditions, each S orally responded to a 77-item "Verbal Inventory Scale" composed of items drawn from the IPAT 8-Parallel Form Anxiety Battery, Questions, Form D and F (Cattell, 1960), the "Confidence Scale" from the Heston Personal Adjustment Inventory, and the Lie Scale from the MMPI. Factorial analyses of the data were conducted.

It was hypothesized that Ss will respond differently to stress as a function of anxiety level in which differential responses will be identified by:

a. Anxious Ss, under stress, will have a longer reading time than low-anxious Ss under stress.

b. More break-up, as measured by rater evaluation, will occur with the anxious Ss under stress than with the anxious Ss under non-stress or with the low-anxious Ss under either condition.

c. Anxious Ss, under stress, will make more situational anxiety responses as measured by the PFAB than will anxious Ss under non-stress, or with the low-anxious Ss under either condition.

d. Confidence scores will vary as a function of anxiety level and stress condition.

The presence of stress was indicated by a significant difference between reading times of Ss responding under the condition of DAF and to Ss responding under a non-DAF condition. Further evidence of stress is indicated by significant differences between break-up scores of Ss

responding under DAF to Ss responding under non-DAF.

Sub-hypothesis "a" was not supported because significant differences were not found between the reading times of the high- and low-anxious Ss.

Sub-hypothesis "b" was not supported in that break-up and anxiety level were not found to be interacting significantly.

Sub-hypothesis "c" was not supported as the D plus F Questions of the PFAB did not significantly reflect differences between a stress and non-stress condition. Although the above Cattell sub-scales did not indicate a sensitivity to differences in stress conditions, the scales did show a relationship to TMAS anxiety scores.

Sub-hypothesis "d" is supported in the first part by a significant relationship found between confidence scores and anxiety level, however, the stress/non-stress conditions did now show significant differences as a function of confidence scores.

Analysis of lie score responses as assessed by the MMPI Lie Scale allowed two questions to be answered tentatively. The answer to the first question, "Does more lying occur under the stressing condition than under the normal condition?" is in the negative. There is no evidence showing a greater amount of lying under stress. Females, however, exhibit a greater amount of lying than do the males. Further, there is significantly more lying in the low-anxious groups than in the high-anxious groups. A negative answer emerged also in regard to the second question, "Does more lying occur when tests are presented verbally as compared to the standard paper-pencil method?" Findings indicate that lie scores are lower under the verbal condition.

General Summary

Stress was evidenced throughout the study by the data showing a higher degree of break-up and delayed reading time under DAF as stated above. Failure to obtain anxiety scale scores which differ significantly under DAF/non-DAF conditions, raises questions, as to whether or not the stress engendered by DAF contains a dimension of anxiety. This question is answered in some degree by findings obtained in an unpublished study by Rankin and Mahone (1964). They report that using standard signs, Rorschach protocols indicate higher anxiety in the responses of Ss under a non-DAF condition. The findings cited above also raise questions about the construct validity of Cattell's D and F anxiety scales which are presented by him as being sensitive to anxiety fluctuations. Further testing for construct validity of Cattell's instrument seems to be justified. One approach could be using the instrument under stress and non-stress conditions for the purpose of determining which items are particulary sensitive to the experimental DAF condition. Another approach could be to experiment with a series of DAF conditions each having a higher stress threshold to see if anxiety appears under higher levels of DAF-induced stress. The writer believes, however, that in the study reported here, a maximum tolerable stress threshold was reached under the DAF experimental condition and further increase would probably induce physical discomfort.

The possibility exists that use of the TMAS scale in classifying Ss according to anxiety level may not be an adequate substitute for experimental manipulation, (e.g., shock, stress producing instructions,

etc.) which induces stress. Taylor cites several studies in which the scale was used as an experimental variable indicative of drive or motivation on the assumption that drive and anxiety level are related, however, such use may be questionable.

Further research is indicated before judgments can be made as to the value of DAF as a stressing variable. Also, the use of other anxiety scales with greater reliability, as well as investigation of projective techniques with a higher degree of sensitivity towards changes in anxiety levels is indicated. It appears at the present time that a re-evaluation of the relationship of stress and anxiety is called for before such techniques as DAF are added to the experimental setting.

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APPENDIX A

The letter appearing in parentheses represents the original scale from which the item was drawn: (H) equals the Heston "Confidence" scale, (D) and (F) equals the "D" and "F" Cattell 8-Parallel-Form Anxiety Battery, Question, and (L) equals the items representing the Lie Scale of the MMPI.

VERBAL INVENTORY SCALE

Form I

(F) 1. I tend to tremble or perspire when I think of a difficult task ahead. (a) True, (b) In between, (c) False.

(H) 2. I like to analyze my thoughts and feelings. (a) True, (b) False.

(D) 3. If something badly upsets me I generally calm down again quite quickly. (a) True, (b) False.

(H) 4. I frequently feel self-conscious about my appearance. (a) True, (b) False.

(F) 5. In physical and mental work, I seem to need rest: (a) only when everyone else is exhausted, (b) in between, (c) before many people, if I am to do my best.

(H) 6. I often think of smart things to say when it is too late to say them. (a) True, (b) False.

(L) 7. Once in a while I think of things too bad to talk about. (a) True, (b) False.

(H) 8. I can face a difficult task without worry. (a) True, (b) False.

(H) 9. I sometimes wish I were more attractive. (a) True, (b) False.

(D) 10. In the past year, I have: (a) been very lucky, (b) in between, (c) had a bit more than my share of bad luck.

(H) 11. I am hesitant about forming decisions. (a) True, (b) False.

(L) 12. I would rather win than lose a game. (a) True, (b) False.

(H) 13. I was happier when I was younger. (a) True, (b) False.

(F) 14. I find myself upset rather than helped by the kind of personal criticism that many people make. (a) Often, (b) Occasionally, (c) Never.

(H) 15. I have often felt there are really few things worth living for. (a) True, (b) False.

(H) 16. At times I have had a queer feeling I was not my old self. (a) True, (b) False.

(L) 17. Once in a while I laugh at a dirty joke. (a) True, (b) False.

(H) 18. I can tackle new situations with a reasonable degree of assurance. (a) True, (b) False.

(D) 19. People sometimes tell me that I show my excitement in voice and manner too obviously. (a) True, (b) False.

(F) 20. I sometimes get feelings of guilt or remorse over quite small matters. (a) True, (b) In between, (c) False.

(H) 21. I sometimes feel too self-conscious. (a) True, (b) False.

(L) 22. At times I feel like swearing. (a) True, (b) False.

(H) 23. I am often unable to reach a decision until too late for action. (a) True, (b) False.

(D) 24. I wake in the night and, through worry, have some difficulty in sleeping again. (a) Often, (b) Sometimes, (c) Never.

(H) 25. It seems I never do things in a manner to gain notice and praise from others. (a) True, (b) False.

(H) 26. It disturbs me for others to watch me while I work. (a) True, (b) False.

(L) 27. I do not always tell the truth. (a) True, (b) False.

(F) 28. However difficult and unpleasant the obstacles, I always persevere and stick to my original intentions. (a) True, (b) In between, (c) False.

(H) 29. I tend to be quick and certain in my actions. (a) True, (b) False.

(H) 30. At times I have wished that I could change my height. (a) True, (b) False.

(L) 31. I get angry sometimes. (a) True, (b) False.

(F) 32. I often say things on the spur of the moment that I later regret. (a) True, (b) In between, (c) False.

(H) 33. I always feel that I can achieve the things I wish. (a) True, (b) False.

(H) 34. I feel few obstacles can hinder me from achieving my final goal. (a) True, (b) False.

(L) 35. Sometimes when I am not feeling well I am cross. (a) True, (b) False.

(H) 36. I often have the blues. (a) True, (b) False

(H) 37. I am generally confident of my own ability. (a) True, (b) False.

(L) 38. If I could get into a movie without paying and be sure I was not seen I would probably do it. (a) True, (b) False.

(H) 39. I sometimes feel that in life's competition I am generally the loser. (a) True, (b) False.

(F) 40. I sometimes feel compelled to count things for no particular purpose. (a) True, (b) False.

(D) 41. Through getting tense I use up more energy than most people in getting things done. (a) True, (b) Uncertain, (c) False.

(H) 42. I frequently feel unworthy. (a) True, (b) False.

(H) 43. I worry over humiliating situations more than most people. (a) True, (b) False.

(D) 44. I would rather stop in the street to watch an artist painting than to listen to some people in an argument. (a) True, (b) In between, (c) False.

(H) 45. I am frequently troubled by thoughts of self-guilt. (a) True, (b) False.

(H) 46. It disturbs me to be "different" or unusual. (a) True, (b) False.

(H) 47. I find it hard to continue work when I do not get enough encouragement. (a) True, (b) False.

(D) 48. I always have enough energy when faced with difficulties. (a) True, (b) In between, (c) False.

(H) 49. I am bothered by inferiority feelings. (a) True, (b) False.

(F) 50. I like to have to understand new gadgets and learn new ways of doing everyday things. (a) True, (b) In between, (c) False.

(H) 51. I am inclined to let people dominate me too much. (a) True, (b) False.

(L) 52. I like to know some important people because it makes me feel important. (a) True, (b) False.

(H) 53. I have often wished that my appearance were different. (a) True, (b) False.

(H) 54. I frequently show myself up disadvantageously. (a) True, (b) False.

(L) 55. I do not like everyone I know. (a) True, (b) False.

(H) 56. My family believes I am as much a success as I could be. (a) True, (b) False.

(H) 57. It is generally hard for me to reach decisions. (a) True, (b) False.

(L) 58. I gossip a little at times. (a) True, (b) False.

(D) 59. My deeper moods sometimes make me seem unreasonable even to myself. (a) True, (b) In between, (c) False.

(H) 60. I can play my best in a contest against an opponent much better than I. (a) True, (b) False.

(H) 61. I sometimes feel isolated and alone when in a group of people. (a) True, (b) False.

(L) 62. Sometimes at elections I vote for men about whom I know very little. (a) True, (b) False.

(H) 63. I am always ready to decide what my next step should be. (a) True, (b) False.

(F) 64. My reserve always stands in the way when I want to speak to an attractive stranger of the opposite sex. (a) True, (b) In between, (c) False.

(H) 65. I can adjust myself readily to new conditions or situations. (a) True, (b) False.

(L) 66. I do not read every editorial in the newspaper every day. (a) True, (b) False.

(H) 67. I often feel rather awkward. (a) True, (b) False.

(H) 68. I frequently feel conspicuous in a group. (a) True, (b) False.

(H) 69. At a banquet, I would do without something rather than ask to have it passed. (a) True, (b) False.

(H) 70. I sometimes put things off when they should be done at once. (a) True, (b) False.

(L) 71. Once in a while I put off until tomorrow what I ought to do today. (a) True, (b) False.

(H) 72. Most persons have made a better life adjustment than I. (a) True, (b) False.

(D) 73. I tend to keep quiet in the presence of senior persons (people of greater experience, age or rank). (a) True, (b) In between, (c) False.

(H) 74. I think social affairs are often a waste of time? (a) True, (b) False.

(L) 75. My table manners are not quite as good at home as when I am out in company. (a) True, (b) False.

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