EFFECT OF LOCUS OF CONTROL AND INSTRUCTIONS ON SPEECH
PERFORMANCE UNDER DELAYED AUDITORY FEEDBACK

by

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INTRODUCTION

LOCUS OF CONTROL

The locus of control dimension, derived from the theoretical foundations of J. B. Rotter's social learning theory (1954), is a personality dimension which posits two characteristic orientations or generalized expectancies concerning the control of reinforcement. Based upon past learning, this locus of control dimension defines and describes an individual's orientation or expectancy as internal or as external:

Internal control refers to the perception of positive and/or negative events as being a consequence of one's own actions and thereby under personal control; external control refers to the perception of positive and/or negative events as being unrelated to one's own behavior and therefore beyond personal control, (Lefcourt, 1966, p. 207).

According to social learning theory, (Rotter, 1954) an individual acquires through learning, a characteristic or generalized expectancy concerning the source and control of reinforcement which is considered a relatively stable behavioral characteristic operating across a wide variety of situations.

The first scale to measure the locus of control dimension was devised by Phares (1955) to measure a general attitude or personality characteristic of attributing the occurrence of reinforcement to chance rather than self. Following Phares' scale, a variety of new scales were developed, however, the most commonly used scale is the Internal-External Control Scale (Rotter, Seeman & Liverant, 1966).
Research on the locus of control dimension (James, 1957; Rotter, 1966; Lefcourt, 1966; Joe, 1971) has demonstrated that internals and externals learn to perceive the locus of control of reinforcement differently and thus form different expectancies. There is further evidence to suggest that internals and externals also learn to value and prefer different reinforcers and reinforcement contingencies consistent with their perceived locus of control (Rotter & Mulry, 1965; Watson & Baumal, 1968; Julian & Katz, 1968; Lefcourt, Lewis & Silverman, 1968; Petzel & Gynther, 1970; Ryckman, Stone & Elam, 1971). Thus, an internal may prefer tasks such as solving arithmetic problems or dart throwing which are generally considered to be tasks related to skill and ability, whereas an external may prefer dice throwing which is a probabilistic or chance determined activity. According to Rotter (1954) the potential for a particular behavior to occur in a given situation is a function of the person's expectancy that the given behavior will secure the available reinforcement, and the value of the available reinforcement for that person.

In order to test the hypothesis that internals and externals prefer different activities and thus, when given a choice, will choose activities consistent with their expectancy, Schneider (1968) administered the Internal-External Control Scale (Rotter, Seeman & Liverant, 1966) and the S-C Test, a forced-choice activity preference scale composed of pairs of skill and chance activities. The S-C Test requires S to choose between 100 pairs of skill or chance activities. The Ss were instructed to indicate which activity they would rather participate
in, and were further instructed to base judgments not upon how well they performed in that particular activity, but rather on their like or dislike for participation in the activity. The hypothesis that preference for skill activities would be associated with an internal locus of control and chance preference to an external locus of control was supported for males only. It was suggested by Schneider (1968a) that since both skill and chance activities used in the study were activities in which females do not ordinarily participate or have direct experience with, (football, hockey, etc.) preference for any of these activities probably reflected something other than the skill-chance dimension for females.

In a follow-up study by Schneider (1968b) three separate activity preference scales were developed, using masculine, feminine, and neutral skill activities. In this second study, the hypothesized relationship of locus of control to skill vs. chance activity preferences was supported for both males and females using the neutral scale, and when the sex of S and the sex identity of the skill activities were congruent.

Hence, it follows that if internals and externals value and prefer different activities, as indicated by Schneider (1968), internals and externals may also perform differently on different activities and on complex experimental tasks. Such differences would depend upon the nature of the task, how the task was perceived by S, and the reinforcement contingency. Research designed to investigate such factors has used two basic research strategies: one to manipulate task instructions
and the other to manipulate task structure. In the operation of the first strategy, a relatively ambiguous task is presented to S with instructions attributing task performance to either skill and ability, or to luck and chance.

Applying this first strategy, Rotter and Mulry (1965) measured decision time on a difficult angle matching task to test the hypothesis that internals and externals would place a different value on the task and its accomplishment depending upon whether the task was perceived as requiring skill or was the result of chance factors. There were actually no correct matches, but for every angle to be matched, there were four equally close alternatives. Based upon the assumption that individuals who place greater value on an outcome take longer to make a difficult discrimination on a task, Rotter and Mulry hypothesized that internals would take longer to make a difficult discrimination on a task which was perceived to be skill determined, and that externals would take longer to decide when the task was perceived as the result of chance. In a 2x2 factorial design, half of the Ss were instructed that the discrimination was so difficult as to be a matter of luck, while the other half of the Ss were instructed that although the discrimination was difficult, previous research had shown that some people are more skilled in making such discriminations. The results indicated a significant interaction between locus of control (internal vs. external) and instructions (skill vs. chance). In support of the hypothesis, it was found that internals took longer to decide on a match under skill instructions,
and externals took longer to decide on a match under chance instructions, (Rotter & Mulry report that most of the difference on the interaction is attributable to the longer time taken by internals under skill conditions).

Lefcourt, Lewis and Silverman (1968) attempted to replicate and extend the study by Rotter and Mulry (1965). Following the basic strategy employed by Rotter and Mulry, Lefcourt et al. (1968) required Ss to make a series of decisions in a situation wherein success was described (according to the instructions) as dependent upon skill or chance. Internal and external Ss were tested on Rotter's (1954) Level of Aspiration Board using Rotter's standard skill or chance instructions. Before each of 20 trials, S made an expectancy statement concerning task performance on the next trial, and E measured decision times. It was hypothesized that if internal Ss value success more in a skill condition, it would be evident in better recall of decisions made and scores earned in a skill as compared with a chance condition, whereas the reverse was predicted for external Ss. It was further predicted that attention paid to the task by S and the incidence of task-relevant and task-irrelevant thoughts would reflect involvement, and therefore, internal Ss would exhibit greater attention to and more task relevant thoughts in a skill determined task than in a chance determined task, with the reverse holding for external Ss.

When decision time, attention, cognitions and recall data were used to test the predicted differential responsiveness to skill or chance directions, the predicted differences were not found. However,
when $S$s' perceptions of the task regarding its skill or chance determination were taken into account (according to a questionnaire), the predicted results were obtained. Internal $S$s generally accepted skill instructions and rejected chance instructions. When the $S$s' biases were included in the data analyses, the predicted differences in value of the task were confirmed.

Using the same basic strategy, in a manner similar to Rotter and Mulry (1965), Watson and Baumal (1968) used a paired-associate task to test internal and external females under differential instructions. In a 2x2 factorial design, half of each group of internals and externals received instructions which stated that the response to the S-R pairs learned would later serve as an avoidance response to avoid shock, and that success depended upon learning skill. The other half of each group received instructions which stated that the response to the S-R pairs learned would sometimes serve as an avoidance response to avoid shock, but on a chance basis.

Watson and Baumal (1968) hypothesized that the expectations of internal $S$s would be confirmed when they possessed control in a situation, (a congruent situation), and the expectations of external $S$s would be confirmed when control was external, determined by chance (a congruent situation); and further, that $S$s in congruent situations would perform more efficiently than $S$s in incongruent situations. Furthermore, it was hypothesized that $S$s in incongruent situations (internals under chance conditions and externals under skill conditions) would become anxious and thus perform less efficiently, making more
errors on the task. The hypothesis was supported and the results showed that internal Ss made more errors when anticipating chance conditions and external Ss made more errors when anticipating control in a situation. The results, were interpreted by Watson and Baumal, (1968) as indicating differential anxiety arousal in different situations.

The second basic research strategy attempts to manipulate task structure by presenting the task in such a manner that it is perceived by S as one requiring skill or one which is the result of chance. This strategy was employed by Ryckman, Stone & Elam (1971) to test the generality of Rotter and Mulry's (1965) position. The task structure was varied using a dart throwing task under skill or chance conditions (unblindfolded for skill, and blindfolded for chance). It was hypothesized that internal Ss would be more involved under skill conditions than under chance conditions and would therefore be more irritated and embarrassed by critical remarks about their performance under skill conditions; and that external Ss would react more strongly to criticism under chance conditions than under skill conditions. The results supported the hypothesis for females only, and showed that internal females were more concerned with their performance outcomes in skill situations where success or failure was dependent upon ability, whereas external females were more concerned under conditions where performance was perceived as unrelated to outcomes.

Generalizations from the results of Rotter and Mulry (1965) have not always been supported. Julian and Katz (1968) proposed on the
basis of the results of Rotter and Mulry (1965) that self-determined rewards are of greater value to internals than to externals under skill conditions, and that the converse is true for externals under chance conditions. Using the research strategy to manipulate task instructions, Ss were presented with a number-series task and were required to choose the next number in the series (for which there was no apparent answer). Unlike previous studies, the task was made into a competitive activity with pairs of Ss participating as opponents, competing to earn the most points. The Ss were given three alternative strategies: to rely on one's own judgment (5 points if correct, 3 points if incorrect); to rely on one's opponent's judgment (5 points if correct, 3 points if incorrect); or to pass (2 points). By feedback, E allowed each S to perceive the opponent S as more competent and thus provide a basis for relying on the opponent's judgment. The hypothesis was not confirmed. Not only did internals prefer to rely on their own skill under skill-determined conditions, but also where task outcomes were seen to be controlled by luck. In explanation, it was suggested by Julian and Katz that the internal control orientation involves, as a motivational aspect, a need to predict one's outcomes, and that even under the chance condition the internals may have been trying to evaluate the response-outcome contingencies though to a lesser extent than under the clearly defined skill setting.

A study by Petzel and Gynther (1970) not only failed to provide further support for Rotter and Mulry (1965) but produced results in
the opposite direction. Using a strategy similar to Rotter and Mulry, Petzel and Gynther administered skill or chance instructions on an anagram task to both internals and externals in a 2x2 factorial design. Contrary to the results of Rotter and Mulry (1965), the task performance of internals was better (more anagrams solved) when given chance instructions than when given skill instructions; and the task performance of externals was better when given skill instructions than when given chance instructions. To explain such results, Petzel and Gynther suggested methodological and sampling differences in comparison to other studies in the area. A possible alternative is suggested by the present author on the basis of Rotter and Mulry's (1965) results. These results showed that it took longer for internals to decide on a match or solution to a problem under skill instructions, and longer for externals to decide on a match or solution under chance instructions. Since the anagram solution task was timed, and Ss were allowed only 30 sec. to complete each anagram, internal Ss under skill instructions and external Ss under chance instructions (in taking longer to decide) were not able to complete as many anagrams in the allotted time as in the incongruent condition.

The observed differences found in the previously cited studies ranging from concurrence with Rotter and Mulry (1965) to complete reversal may be accounted for at least in part, by task differences. It has been suggested (Phares, Wilson & Klyver, 1971; Phares & Wilson, 1971) that ambiguous situations allow generalized internal-external expectancies to operate with greater force than do highly structured
situations, and that highly structured situations may provide such explicit cues that individual differences in response tendencies are significantly depressed. Furthermore, when such cues are absent, ambiguous or relatively weak, a S should place greater reliance on expectancies generalized from past experience.

One experimental task which may be ideally suited to test individual differences in response tendencies between internals and externals is delayed auditory feedback (DAF). Because DAF is a relatively ambiguous situation, explicit cues related to task structure or task expectancies are absent or relatively weak and would thus allow Ss to rely more strongly on past experience and their generalized expectancies.
DELAYED AUDITORY FEEDBACK

Delayed auditory feedback (DAF), has been the subject of research in psychology and other related fields since it's discovery by B. S. Lee (1950). Under DAF, S reads aloud into the microphone of a modified tape recorder, while hearing his own voice returning to him through earphones, but delayed by about 1/4 sec. Typically, Ss experience a variety of speech disturbances and often produce disfluencies similar to stuttering.

The successful regulation of speech and speech patterns, according to a servo-control model or sensory feedback point of view (Fairbanks, 1954; Mysak, 1959; Sklar, 1969; MacNeilage, 1970; Susman, 1972) depends upon the continuous monitoring of the ongoing process of speech by means of feedback mechanisms derived from tactile kinesthetic and proprioceptive feedback as well as auditory feedback via air conduction and bone conduction. In normal speech these feedback sources are integrated and supplement each other. Under DAF, proprioceptive and tactile feedback continue to be available, while the delayed amplified auditory signal over-rides the undelayed auditory feedback. Thus DAF produces disturbances of speech output resulting in increased articulatory errors, (Atkinson, 1953; Fairbanks & Guttman, 1958; Lee, 1951; Tiffany & Hanley, 1956; Korobow, 1955); longer duration of speech, (Black, 1951; Atkinson, 1953; Fairbanks, 1955; Spilka, 1954; Hanley & Tiffany, 1954); greater sound pressure, (Black, 1951; Atkinson, 1953; Spilka, 1954; Fairbanks, 1955); higher fundamental frequency; (Fairbanks, 1955); and occasionally
complete disruption or blocking of speech (Black, 1951). In effect, the DAF misinforms the speech control system, according to Fairbanks (1955), and thus impairs normal speech performance.

Atkinson (1953) describes Ss experiencing DAF as generally exhibiting one or more of the following reactions:

The voice becomes louder, words, syllables or phonemes are repeated, words are mispronounced, the speech rate becomes slower, the face becomes red, and the palms perspire.

Within the research on DAF, the major independent variables used have been the delay time and the intensity level of the feedback at the speakers ear. Delay times have been varied from zero to 0.8 sec. Generally, intensity level has been held constant while delay time has been varied, or delay time has been held constant while varying intensity, although both have been manipulated concurrently. The principle dependent variables have been related to duration of phase (reading time), sound pressure level (intensity of utterance), and articulatory or speech changes.

Black (1951) observed progressive retardation in oral reading rate under increased increments of delay. Black measured the time to read five-syllable phrases as a function of delay times ranging from 0.05 to 0.3 sec. with intensity at the headphones held constant. The results showed that the suppression of speech increased as a function of delay up to 0.18 sec., then declined. According to Black, the DAF experience was variously described by Ss as: "a stretching-out feeling under short delays and near traumatic effects
under longer delays". Some of the effects noted were: blocking of speech, facial contortions, prolongation and slurring of sounds and repetition of syllables. The Ss usually found the experience difficult to describe and often referred to feelings of frustration or surprise.

Butler and Calloway (1957) investigated four levels of delay and four intensity levels in a factorial design using different Ss for each condition. The results showed a significant interaction between delay and intensity. It was suggested that there is an optimal range of intensities within which various levels of delay will be differentially effective.

Fairbanks (1955) describes the various methods and mechanisms used by Ss to cope with, overcome, or adapt to the effects of DAF. One form of resistance is the slowing of speech, another is increased vocal intensity (a common reaction to noise). Resistance is often accompanied by greater muscular tension in the effector from which increased vocal intensity and heightened fundamental frequency originate. Thus the speech output under DAF reflects the various effects of resistance by Ss as well as the effects of interference with the sensory feedback pathways.

Apart from the immediate disruptive effects of DAF upon speech, it has been demonstrated that DAF also has suppressive effects upon learning behavior. According to the research on learning and retention under DAF (King, 1963; King, 1965; King & Dodge, 1965; King, 1968; King & Cotton, 1969; Kravetz, 1969) it has been demonstrated
that immediate recall of meaningful material read and practiced under DAF is significantly poorer than under appropriate control conditions. However, it has also been shown (King, 1968) that individual differences among Ss in recalling material after DAF presentation are rather large. The quantity of material recalled by experimental Ss varied from complete loss to equal and sometimes better performance than that of control Ss.

By relating reading speed and vocal intensity to performance under DAF, King (1968) demonstrated that retention of material read under DAF was correlated with different variables for males than for females. For female Ss the best predictor of retention under DAF was reading speed: the slower the female Ss reading speed, the poorer the Ss retention of the material read. For male Ss, the best predictor of retention under DAF was the sound level change. A positive correlation indicated that the greater the sound level change under DAF the greater the retention of the material read under DAF.

Though individual differences have been observed in Ss performing under DAF, and personality has been considered by many to be a promising area in DAF research, there is little evidence to support the relationship between personality variables and performance under DAF.

Spilka (1954) correlated various indices of vocal disturbance to a number of personality traits measured by the California Test of Personality, Guilford's STDCR, the total E scale, and the Paranoia and Schizophrenia subtests of the MMPI. Spilka's general hypothesis
was that Ss who rely on exteroceptive cues would be most affected by DAF since this involves a disturbance in external balance; whereas Ss who rely on proprioceptive cues would be least affected. The relationships were found to be low but consistent, and to provide some support for the hypothesis.

Korobow (1955) used an 852 item factorially designed personality test and obtained some low correlations between speech disturbance and personality traits. Beaumont and Foss (1957) found a positive relationship between tendency to perform poorly under DAF and tendency to show perseveration on the Luchins' Einstellung Test.

To determine whether DAF reaction may be affected by Ss' expectancies, Timmons (1971) gave Ss differential information about the task before S read under DAF. One group was told that most Ss encounter severe speech difficulties and that they might expect to stutter. A second group was told to expect a slight reaction which could be ignored, and a third group was simply instructed to read (with no information given). No significant differences were found on DAF performance as a function of expectancy or prior information. It was suggested by Timmons that since DAF reaction seems very stable under a variety of conditions, it may be primarily a physiologically based reaction not controlled by expectations.

Though there is a small amount of evidence to suggest a relationship between DAF performance and personality, the question still remains however as to why some Ss show little disturbance and almost normal performance under DAF, and others are severely disrupted and
almost totally incapacitated.
PURPOSE AND HYPOTHESIS

Based upon the findings of Rotter and Mulry (1965) and other studies (Watson & Baumal, 1968; Lefcourt, Lewis & Silverman, 1968; Ryckman, Stone & Elam, 1971) a pilot study (Wood & Geller, 1973) was designed to provide further evidence that internals and externals value and prefer different reinforcement contingencies and thus may perform differently on a complex experimental task; and to provide the foundation and basis for the present investigation. Employing the basic strategy of manipulating instructions, Wood and Geller investigated the effects of locus of control and differential instructions on speech performance under DAF. In a 2x2 factorial design, 20 internals and 20 externals performed an oral reading task under DAF after receiving skill or chance instructions. Performance was measured by the total time to complete the task, and the number of speech errors. The criteria for speech errors included: mispronunciations, repetition of syllables and continuent sounds, omissions, substitutions, omitted or added word endings, and complete blocking of speech.

The results indicated a significant interaction of locus of control (internal vs. external) and instructions (skill vs. chance) on speech errors. Internal Ss made fewer speech errors under skill instructions than under chance instructions and external Ss made fewer speech errors under chance instructions than under skill instructions. The Least Significant Differences Test indicated that internal Ss under skill instructions performed significantly better than internal
Ss under chance instructions and that internal Ss under skill instructions also performed significantly better than externals under skill instructions. Externals did not perform significantly different under skill and chance instructions. There were no significant differences between the groups on time to complete the task, though the trend was in the predicted direction. The results of a significant chi-square test indicated that, Ss who had received skill instructions attributed their task performance under DAF to skill or ability, whereas, Ss who had received chance instructions attributed task performance under DAF to luck or chance. It was concluded that speech performance under DAF was affected by locus of control in the presence of differential instructions, and that the observed differences could not be accounted for by differences in time to complete the task.

The purpose of the present study was to extend the pilot investigation to include several additional variables. Of major importance was the addition of sex as an independent variable, since it has been shown to account for differences on the locus of control dimension, (Schneider, 1968; Ryckman, Stone & Elam, 1971; Joe, 1971) as well as differences in the learning and performance of Ss under DAF (King, 1968; Timmons, 1971). It was predicted that sex would interact significantly with the other major variables to produce differences between the groups. A retention test was included to further evaluate the effects of DAF, locus of control, and instructions. It was predicted that there would be differences between the locus of control groups as well as between males and females on the amount of
material learned under DAF.

Based upon Rotter and Mulry (1965) as well as the pilot study (Wood & Geller, 1973) the major hypothesis for the present study predicted that internal Ss receiving instructions attributing task performance to skill and ability would perform better (make fewer speech errors) than internal Ss receiving instructions attributing task performance to luck and chance; and conversely, that external Ss receiving instructions attributing task performance to luck and chance would perform better than external Ss receiving instructions attributing task performance to skill and ability.
METHOD

Subjects. The Ss were 96 male and female students enrolled at Virginia Polytechnic Institute and State University. After prior testing with the Internal-External Control Scale (Rotter, Seeman & Liverant, 1966), a group of 48 internal Ss (scores of 0-6), and a group of 48 external Ss (scores of 17-23) were selected to participate. Though Ss were assigned to one of two locus of control groups according to locus of control score, Ss were randomly assigned to receive either skill or chance instructions. Thus, there were four groups of 24 Ss each, with an equal number of male and female Ss in each group. Group one, Internal-skill, was comprised of internal Ss who received skill instructions; group two, Internal-chance, was comprised of internal Ss who received chance instructions; group three, External-skill, was comprised of external Ss who received skill instructions; and group four, External-chance, was comprised of external Ss who received chance instructions.

Apparatus. The Internal-External Control Scale (see Appendix A) was used to assess the locus of control for each S prior to participation. A 180 word passage of reading material (see Appendix B) from Standard Test Lessons in Reading (McCall & Crabbs, 1950) on the subject of termites was used as the verbal material to be read aloud under DAF by each S. An 11-item multiple-choice retention test, (see Appendix C) also from Standard Test Lessons in Reading (McCall & Crabbs, 1950), was used to assess learning under DAF.
short six-item questionnaire was used to survey S's attitudes, perceptions and opinions concerning the experiment (see Appendix D).

An electric digital timer operated by E was used to time each S's performance under DAF. A General Electric cassette recorder was used to play the pre-recorded skill or chance instructions to each S. The DAF equipment consisted of a Bell and Howell tape recorder model 785A modified for DAF by the Lafayette Instrument Company, and a headset with 300 ohm earphones and attached microphone, Arvid model LT700. A Realistic sound level meter, model 33-1028 was used to test sound intensity at the earphones. The DAF equipment was set at 0.20 sec. delay for all Ss and the sound intensity at the earphones was approximately 90 db. for all Ss.

Procedure. After being greeted by E, and seated in front of the DAF equipment, the pre-recorded skill or chance instructions were played to S. The Ss who received skill instructions (Internal-skill and External-skill) heard the following instructions:

This is the delayed auditory feedback equipment. When you have put on the earphones, you will read this passage of material into the microphone. As you read, you will hear your voice returning to you through the earphones, however, it will be delayed by about a quarter of a second, after you have spoken them. Your performance in this experiment will be due entirely to your skill and ability, that is, we are attempting to measure the degree of mastery in performance from subject to subject on a complex task. Past research has indicated that an individual's performance level on this task is significantly related to one's skill and ability in other situations. It is important that you read all of the material. When you have finished, remove the earphones and I will stop the machine. Do you have any questions?
The Ss in groups receiving chance instructions (Internal-chance and External-chance) received the following pre-recorded instructions prior to performance under DAF:

This is the delayed auditory feedback equipment. When you have put on the earphones, you will read this passage of material into the microphone. As you read, you will hear your voice returning to you through the earphones, however, it will be delayed by about a quarter of a second after you have spoken them. Your performance in this experiment will be due entirely to luck and chance, that is, we are attempting to measure the degree of random and unpredictable variation in performance from subject to subject on a complex task. Past research has indicated that an individual's performance level on this task is completely unrelated to one's skill and ability in other situations. It is important that you read all of the material. When you have finished, remove the earphones and I will stop the machine. Do you have any questions?

Following the initial instructions, each S put on the headset, adjusted the earphones to fit properly and comfortably. The E gave S the reading material and instructed S to begin reading aloud as soon as the DAF recorder was activated. When S had read all of the material on the page, the recorder was stopped and S removed the headset. Immediately following performance under DAF, each S was given the retention test and completed the questionnaire.

Without knowing whether S was an internal or an external, or the instructions S received, the performance of each S was timed and the speech errors were counted by replaying the DAF tape. Scores were recorded by S number only. To assure reliability of scoring, the time to complete the task for each S was evaluated twice and the tape was replayed approximately 4-5 times to score speech errors. Each S's speech errors was recorded on a Xeroxed copy of the reading material.
(one copy for each S). One point was scored for each speech error.

The criteria used to define a speech error were:

1. Repetition of syllables and continuent sounds
2. Mispronunciations
3. Omissions or substitutions
4. Omitted or added word endings
5. Inversion of words
6. Unusually long breaks or blocking of speech
RESULTS

SKILL VS. CHANCE ATTRIBUTION

Since interpretation of the performance measures may depend upon whether or not Ss did in fact believe the experimental instructions, inquiries were made to determine whether the experimental manipulation was effective. On a post-experimental questionnaire item which read: "I think my performance on this task was due to: (1) skill, (2) luck, (3) ability, (4) chance," Ss attributed their task performance under DAF to skill or chance. A 2x2 table was constructed, (see Table 1) comprised of skill-instructed Ss who attributed task performance to skill; skill-instructed Ss who attributed task performance to chance; chance-instructed Ss who attributed task performance to skill; and chance-instructed Ss who attributed task performance to chance. Under the experimental conditions it was expected that Ss would be unequally distributed in the cells with more Ss in congruent cells, (skill instruction-skill attribution and chance instruction-chance attribution) than in incongruent cells (skill instruction-chance attribution and chance instruction-skill attribution). A significant Chi-square test ($X^2 = 32.06; df = 1; p < .001$) indicated that Ss were not equally distributed in the cells and therefore it was concluded that the experimental instructions were effective, and that Ss were responsive to the bias of the experimental instructions. It was further expected that the total number of Ss in each attribution category (skill and chance) would be about
<table>
<thead>
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<th>Skill Instruction</th>
<th>Chance Instruction</th>
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<td>42</td>
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<td>58</td>
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<td>Total</td>
<td>48</td>
<td>48</td>
<td>96</td>
</tr>
</tbody>
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equal since half the Ss received skill instructions and half the Ss received chance instructions. The total number of Ss in each attribution category were not equal. Fifty-eight Ss attributed task performance under DAF to skill and 38 Ss attributed task performance to chance (see Table 1). Though more Ss attributed task performance to skill than to chance a binomial test indicated that the difference was not statistically significant. Binomial tests within the cells indicated that the proportion of internal and external Ss in each cell was not significantly different. Therefore it was concluded that internals and externals did not differentially believe or disbelieve the instructions.

SPEECH ERRORS

Because speech errors may be considered ordinal rather than interval data, and because the data contained several extreme scores, it was decided that performance under DAF as measured by speech errors, should be analyzed by non-parametric methods. The Mann-Whitney U Test was used to test for differences between the groups on the experimental variables. Table 2 shows the median number of speech errors for each of the eight experimental groups and Mann-Whitney U comparisons between the groups on locus of control, sex and instructions. The major comparisons related to the research hypothesis were those which compared internal Ss under skill vs. chance instructions, and those which compared external Ss under skill vs. chance instructions (see comparisons under Instructions on Table 2). Internal-males under skill instructions made significantly fewer speech errors under
TABLE 2
Group Medians and Mann-Whitney U Tests for Locus of Control, Instructions, and Sex on Speech Errors

<table>
<thead>
<tr>
<th>Group</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal-male-skill</td>
<td>5.5</td>
</tr>
<tr>
<td>Internal-male-chance</td>
<td>15.5</td>
</tr>
<tr>
<td>Internal-female-skill</td>
<td>7.5</td>
</tr>
<tr>
<td>Internal-female-chance</td>
<td>7.0</td>
</tr>
<tr>
<td>External-male-skill</td>
<td>9.0</td>
</tr>
<tr>
<td>External-male-chance</td>
<td>8.5</td>
</tr>
<tr>
<td>External-female-skill</td>
<td>10.5</td>
</tr>
<tr>
<td>External-female-chance</td>
<td>5.0</td>
</tr>
</tbody>
</table>

**Locus of Control**

<table>
<thead>
<tr>
<th>Comparison</th>
<th>U</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal-male-skill vs. External-male-skill</td>
<td>29.0</td>
<td>&lt; .02</td>
</tr>
<tr>
<td>Internal-male-chance vs. External-male-chance</td>
<td>45.0</td>
<td>&gt; .05</td>
</tr>
<tr>
<td>Internal-female-skill vs. External-female-skill</td>
<td>54.5</td>
<td>&gt; .05</td>
</tr>
<tr>
<td>Internal-female-chance vs. External-female-chance</td>
<td>44.5</td>
<td>&gt; .05</td>
</tr>
</tbody>
</table>

**Instructions**

<table>
<thead>
<tr>
<th>Comparison</th>
<th>U</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal-male-skill vs. Internal-male-chance</td>
<td>19.0</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Internal-female-skill vs. Internal-female-chance</td>
<td>71.5</td>
<td>&gt; .05</td>
</tr>
<tr>
<td>External-male-skill vs. External-male-chance</td>
<td>64.0</td>
<td>&gt; .05</td>
</tr>
<tr>
<td>External-female-skill vs. External-female-chance</td>
<td>20.0</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>

**Sex**

<table>
<thead>
<tr>
<th>Comparison</th>
<th>U</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal-male-skill vs. Internal-female-skill</td>
<td>50.0</td>
<td>&gt; .05</td>
</tr>
<tr>
<td>Internal-male-chance vs. Internal-female-chance</td>
<td>37.5</td>
<td>&gt; .05</td>
</tr>
<tr>
<td>External-male-skill vs. External-female-skill</td>
<td>66.0</td>
<td>&gt; .05</td>
</tr>
<tr>
<td>External-male-chance vs. External-female-chance</td>
<td>31.5</td>
<td>&lt; .05</td>
</tr>
</tbody>
</table>
DAF than Internal-males under chance instructions and External-females under chance instructions made significantly fewer speech errors under DAF than External-females under skill instructions. The other comparisons on the instruction variable were not significant, thus the hypothesis which predicted that internal Ss under skill instructions would make fewer speech errors under DAF than internal Ss under chance instructions; and conversely that external Ss under chance instructions would make fewer speech errors under DAF than external Ss under skill instructions, was only partially supported. The hypothesis was confirmed for Internal-males and External-females only.

To determine whether internals and externals perform differently under DAF, comparisons were made on the locus of control variable (see Table 2). Internal-males under skill instructions made significantly fewer speech errors under DAF than External-males under skill instructions. The other locus of control comparisons were not significant. Therefore, it was concluded that internal and external males under skill instructions perform differently under DAF but that there was no strong main effect of locus of control.

To determine whether males and females perform differently under DAF, comparisons were made on the sex variable (see Table 2). External-females under chance instructions made significantly fewer speech errors under DAF than External-males under chance instructions. The other comparisons on the sex variable were not significant. Therefore it was concluded that external females and males under chance instructions perform
differently under DAF, but that there was no strong main effect of sex.

TIME TO COMPLETE THE TASK

A 2x2 factorial analysis of variance (locus of control x sex x instructions) on time to complete the task under DAF indicated a significant main effect due to instructions, \((F = 4.76; \text{df} = 1/88; p < .05)\). The Ss who received skill instructions (\(\bar{X} = 92.62\) sec.) took significantly less time to complete the DAF task than Ss who received chance instructions (\(\bar{X} = 101.68\) sec.). There was also a significant three-way interaction of locus of control x sex x instructions, \((F = 4.30; \text{df} = 1/88; p < .05)\). Figure 1 shows the mean time to complete the task under DAF for each of the eight experimental groups. It can be seen in Figure 1 that the four external groups appear to cluster together at approximately the same value, whereas the four internal groups appear to be farther apart, especially the two Internal-male groups. To evaluate the three-way interaction and determine which groups were significantly different, separate analyses were computed. A separate 2x2 factorial analysis of variance (sex x instructions) using the error term from the overall analysis, computed for externals only, indicated no significant differences. Therefore, the four external groups shown to be comparatively close in value on Figure 1 are, in fact, not significantly different. A separate 2x2 factorial analysis of variance (sex x instructions) using the error term from the overall analysis, computed for internal Ss only, indicated a significant main effect due to
Figure 1. Mean time to complete the DAF task as a function of locus of control, sex, and instructions.
instructions \((F = 8.60; \, df = 1/88; \, p < .01)\). Therefore, internal Ss who received skill instructions took significantly less time to complete the task under DAF than internal Ss who received chance instructions. This same analysis indicated a significant interaction of sex and instructions, \((F = 5.10; \, df = 1/88; \, p < .05)\). To further break down this interaction a separate one-way analysis of variance for Internal-females and a separate one-way analysis of variance for Internal-males was computed on skill vs. chance instructions. The separate analysis for Internal-females on skill vs. chance instructions was not significant, however, the separate analysis for Internal-males under skill vs. chance instructions was significant, \((F = 13.48; \, df = 1/88; \, p < .01)\). Internal-males under skill instructions took significantly less time to complete the DAF task than the Internal-males under chance instructions. It was therefore concluded that most of the variance on the three-way interaction (locus of control x sex x instructions) on time to complete the task under DAF was due to internals, and more specifically to Internal-male Ss. If better performance is defined in terms of less time to complete the task, then the hypothesis that internal Ss would perform better on the DAF task under skill instructions than under chance instructions, and conversely that external Ss would perform better under chance instructions than under skill instructions was partially supported on time variable. The hypothesis was confirmed for internal Ss (with most of the variance due to Internal-male Ss).
RETENTION

A 2x2x2 factorial analysis of variance (locus of control x sex x instructions) was computed using Ss scores on the retention test. There were no significant differences between the groups on retention of material read under DAF.

ERROR ESTIMATES

On the post-experimental questionnaire each S was asked to estimate the number of speech errors he made while performing under DAF. A difference score based upon the absolute value of the difference between S's errors and S's estimate was used to calculate a Kruskall-Wallis one-way analysis. A significant Kruskall-Wallis Test ($H = 280.64; df = 3; p < .001$) indicated that internal Ss under skill instructions were significantly more accurate in their estimates of errors than the other three groups, (Internal-chance, External-skill, External-chance).
DISCUSSION

The results of this experiment partially support the major hypothesis which predicted that internal Ss under skill instructions would perform better (make fewer speech errors) than internal Ss under chance instructions; and conversely that external Ss under chance instructions would perform better than external Ss under skill instructions. The hypothesis was confirmed for Internal-males and External-females, but not for Internal-females and External-males. If better performance under DAF is defined in terms of less time to complete the task, the results on the time variable also partially support the hypothesis.

The results of the present study lend support to Rotter and Mulry (1965) and other related studies (Watson & Baumal, 1968; Lefcourt, et. al., 1968; Ryckman, et. al., 1971). Rotter and Mulry suggest that the operation of motivational factors explains better performance by internal Ss under skill conditions and better performance by external Ss under chance conditions. Presumably internals and externals are more motivated in congruent conditions because of greater reinforcement value and less motivated in incongruent conditions. Watson and Baumal on the other hand suggest that internals perform better under skill conditions and externals perform better under chance conditions because individuals in incongruent situations experience anxiety which causes errors and interferes with S's performance on complex tasks. Watson and Baumal further suggest that Ss will be least anxious in
that situation which represents their preference for either internal or external control.

In order to facilitate interpretation of the results on speech errors, an extension of present theory (Rotter & Mulry, 1965; Rotter, 1966; Watson & Baumal, 1968) is proposed which would introduce an additional theoretical construct in terms of an active-passive dimension. It is proposed that the three experimental variables (locus of control, sex, instructions) may also have active and passive elements. On the locus of control variable an internal expectancy may reflect an active orientation while an external expectancy may reflect a passive orientation. Joe (1971) reported that on the Adjective Check List, internally oriented Ss were more likely than externally oriented Ss to describe themselves as assertive, achieving, powerful, independent, effective, and industrious. Whereas Rotter (1966) suggests that a belief in external control is related to a general passivity; and Merton (1946) also states that there may be a relationship between passivity and the belief in chance or luck. On the sex variable, a male may be actively oriented while a female may be passively oriented, since males have traditionally been assigned active roles in our society and females have traditionally been assigned passive roles. On the instruction variable, skill instructions reflect an active participation on the part of S, while chance instructions reflect a passive participation on the part of S. Under skill instructions, Ss believe that their efforts and abilities have an effect on events, whereas under chance instructions Ss believe that they have little or no
control over events.

On this basis it is suggested that a completely active situation would be defined as an Internal-male under skill conditions; and a completely passive situation would be defined as an External-female under chance conditions. All other combinations of the experimental variables would reflect a mixture of active and passive elements. Thus, being an Internal-female would not be as active a condition as being an Internal-male, or being an External-male would not be as passive a condition as being an External-female. By referring to these conditions as congruent or not congruent as described by Watson and Baumal (1968), better performance under completely active or completely passive conditions may be explained. Watson and Baumal suggest that individuals perform most efficiently in situations in which the actual environmental locus of control and the person's preference for, or appraisal of the locus of control are congruent. A congruent situation is defined by Watson and Baumal as one in which the person's expectation concerning the agency of control is confirmed. Thus, the expectations of internals are confirmed when they possess control, and the expectations of externals are confirmed when control is determined by chance. To carry the discussion one step further; the expectations of males are confirmed when they possess control, and the expectations of females are confirmed when they do not possess control. It is therefore suggested that the present results indicate that the extreme groups consisting of completely active elements or completely passive elements (Internal-male-skill and External-female-chance)
are also completely congruent situations in which S's expectations are more completely confirmed than in the other groups; and that Ss within these groups perform more efficiently than Ss in groups not completely congruent.

The results on time to complete the task also lend support to Rotter and Mulry (1965) and other related studies (Watson & Baumal, 1968; Lefcourt, et. al., 1968; Ryckman, et. al., 1971). These results parallel those of Rotter and Mulry (1965) in that significant differences were found for internals while the differences for externals were not significant (though in the predicted direction). Rotter and Mulry found no significant effects due to sex, however, the present results indicated that most of the variance on the time analysis was due to Internal-males.

The analysis which indicated that Internal-skill Ss made more accurate estimates of their speech errors on the post-experimental questionnaire partially supports the hypothesis made by Lefcourt, et. al., (1968). Lefcourt, et. al. (1968) proposed that if internal Ss value success more in a skill condition then this concern should be evident in better recall of decisions made and scores earned in a skill as compared with a chance condition; with the reverse predicted for external Ss. Though the results of Lefcourt, et. al. (1968) did not support their hypothesis, the present study offers evidence to partially support their hypothesis.

There are a number of criticisms which may be directed against the present study. It is possible that since DAF is generally
disruptive and may be a source of threat or anxiety (Rankin, 1968) that variables related to the DAF task may have produced effects which interact with locus of control, sex, and instructions.

Though the speech disturbances and disfluencies produced by DAF have generally been considered to be primarily due to the disruption of the sensory feedback pathways, (Fairbanks, 1955; Yates, 1963; Timmons, 1971), the present study provides evidence to suggest that a personality variable (locus of control) in the presence of differential instructions (skill or chance) may modify Ss response to DAF. It is suggested that motivational factors (Rotter & Mulry, 1965) or anxiety factors (Watson & Baumal, 1968) may account for such differences in response.
SUMMARY

The present study investigated the effects of locus of control and differential instructions on speech performance under DAF. Internal and external Ss received either skill or chance instructions prior to DAF performance. The results indicated that Internal-males under skill instructions made fewer speech errors under DAF than under chance instructions and that External-females under chance instructions made fewer speech errors than under skill instructions. Furthermore, internal Ss take less time to complete the DAF task under skill instructions than under chance instructions. Thus, the hypothesis that under DAF internals would perform better (make fewer speech errors or take less time) under skill instructions than under chance instructions and conversely that externals under chance instructions would perform better than under skill instructions, was only partially confirmed.
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INTERNAL-EXTERNAL CONTROL SCALE
Rotter, Seeman and Liverant, 1966

This is a questionnaire to find out the way in which certain events in our society affect different people. Each item consists of a pair of alternates lettered a or b. Please select the one statement of each pair (and only one) which you more strongly believe to be the case as far as you're concerned. Be sure to select the one you actually believe to be more true rather than the one you think you should choose or the one you would like to be true. This is a measure of personal belief; obviously, there are no right or wrong answers.

Your answers to the items on this inventory are to be recorded on a separate sheet which is loosely inserted in the booklet. Remove this answer sheet now. Print your name on the answer sheet, then finish reading these directions. Do not open the booklet until you are told to do so.

Please answer these items carefully, but do not spend too much time on any one item. Be sure to find an answer for every choice. Find the number of the item on the answer sheet and indicate your choice of the "a" or "b" statement by circling the "a" or "b" beside the appropriate item number.

In some instances you may discover that you believe both statements or neither one. In such cases, be sure to select the one you more strongly believe to be the case as far as you're concerned. Also try to respond to each item independently when making your choice; do
not be influenced by your previous choices.

REMEMBER

Select that alternative which you personally believe to be more true.
I more strongly believe that:

1. a. Children get into trouble because their parents punish them too much.
    b. The trouble with most children nowadays is that their parents are too easy with them.

2. a. Many of the unhappy things in people's lives are partly due to bad luck.
    b. People's misfortunes result from the mistakes they make.

3. a. One of the major reasons why we have wars is because people don't take enough interest in politics.
    b. There will always be wars, no matter how hard people try to prevent them.

4. a. In the long run, people get the respect they deserve in this world.
    b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.

5. a. The idea that teachers are unfair to students is nonsense.
    b. Most students don't realize the extent to which their grades are influenced by accidental happenings.

6. a. Without the right breaks one cannot be an effective leader.
    b. Capable people who fail to become leaders have not taken advantage of their opportunities.

7. a. No matter how hard you try, some people just don't like you.
    b. People who can't get others to like them, don't understand how to get along with others.

8. a. Heredity plays the major role in determining one's personality.
    b. It is one's experiences in life which determine what they're like.

9. a. I have often found that what is going to happen will happen.
    b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.

10. a. In the case of the well-prepared student there is rarely if ever such a thing as an unfair test.
    b. Many times exam questions tend to be so unrelated to course work that studying is really useless.

11. a. Becoming a success is a matter of hard work; luck has little or nothing to do with it.
b. Getting a good job depends mainly on being in the right place at the right time.

12. a. The average citizen can have an influence in government decisions.
   b. This world is run by the few people in power, and there is not much the little guy can do about it.

13. a. When I make plans, I am almost certain that I can make them work.
   b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.

14. a. There are certain people who are just no good.
   b. There is some good in everybody.

15. a. In my case, getting what I want has little or nothing to do with luck.
   b. Many times we might just as well decide what to do by flipping a coin.

16. a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
   b. Getting people to do the right thing depends upon ability; luck has little or nothing to do with it.

17. a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand or control.
   b. By taking an active part in political and social affairs the people can control world events.

18. a. Most people don't realize the extent to which their lives are controlled by accidental happenings.
   b. There really is no such thing as "luck."

19. a. One should always be willing to admit his mistakes.
   b. It is usually best to cover up one's mistakes.

20. a. It is hard to know whether or not a person really likes you.
   b. How many friends you have depends upon how nice a person you are.

21. a. In the long run, the bad things that happen to us are balanced by the good things.
   b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

22. a. With enough effort we can wipe out political corruption.
23. a. Sometimes I can't understand how teachers arrive at the grades they give.
   b. There is a direct connection between how hard I study and the grade I get.

24. a. A good leader expects people to decide for themselves what they should do.
   b. A good leader makes it clear to everybody what their jobs are.

25. a. Many times I feel that I have little influence over the things that happen to me.
   b. It is impossible for me to believe that chance or luck plays an important role in my life.

26. a. People are lonely because they don't try to be friendly.
   b. There's not much use in trying too hard to please people; if they like you, they like you.

27. a. There is too much emphasis on athletics in high school.
   b. Team sports are an excellent way to build character.

28. a. What happens to me is my own doing.
   b. Sometimes I feel that I don't have enough control over the direction my life is taking.

29. a. Most of the time I can't understand why politicians behave the way they do.
   b. In the long run the people are responsible for bad government on a national as well as on a local level.
APPENDIX B
There were about 300,000 blind termites or white ants in a termite nest. About 100,000 of them grew wings, left the darkness they loved, sought the light, and flew away in many directions. A male and a female came to earth together. They lost their wings, found a crack in a rotten log or plank, and mated. The male soon died, but the female lived on for ten, twenty, thirty, or more years.

The female began a new colony, laying eggs that hatched out sexless worker and warrior ants. This queen laid many thousand eggs a day, perhaps 100,000 eggs in all during her lifetime.

These millions of termites, eating damp wood, cause damage to houses and other buildings amounting to millions of dollars every year. There are certain simple rules to be followed in guarding against destruction caused by termites. No wooden part of a building should touch the ground. The supports for a building should be of such material as stone or concrete. Painting wood nearest the ground with creosote is an added caution. Do not build your home so that it may become a home for termites!
RETTENTION TEST

1. Termites are (a) strong (b) weak (c) blind (d) deaf
2. The number of termites in this nest was about (a) 1,000 (b) 30,000 (c) 100,000 (d) 300,000
3. These insects love the (a) sunlight (b) darkness (c) shadow (d) twilight
4. How many of the termites in the nest grew wings? (a) one-quarter (b) one-third (c) one-half (d) all
5. All the termites that grew wings flew away in (a) the same direction (b) opposite directions (c) many directions (d) four directions
6. After mating, the female died (a) at once (b) soon (c) in two years (d) after many years
7. The termite that lived a long time was called (a) king (b) female (c) queen (d) male
8. These insects love to eat (a) dry wood (b) damp wood (c) hard wood (d) any kind of wood
9. The wooden parts of a building should (a) reach bedrock (b) go deep into the ground (c) not touch the ground (d) be painted
10. What may termites do to our houses? (a) build them (b) cover them (c) strengthen them (d) weaken them
11. The function of creosoting is to (a) minimize destruction (b) facilitate mating (c) reduce egg-laying (d) multiply males
QUESTIONNAIRE

This questionnaire is an attempt to obtain further information on this experiment and to help improve future experiments of this kind - so please answer honestly!

1. I would be willing to return and take part in this experiment again:
   1. Yes
   2. No

2. I found this experiment to be:
   1. Very interesting and stimulating
   2. Interesting
   3. Neither interesting nor boring
   4. Boring
   5. Very boring and tiresome

3. A rough estimate of my errors during my performance on this task is:
   1. ___ errors per paragraph
   2. ___ errors over-all

4. On a 4-point scale, I would generally rate my performance as:
   1. Severely disrupted
   2. Moderately disrupted
   3. Mildly disrupted
   4. Not disrupted

5. I think my performance on this task was due to:
   1. Skill
   2. Luck
   3. Ability
   4. Chance

6. I would do better on this task:
   1. If I were not so nervous
   2. If I were given a second chance to try my luck
   3. If I were given enough practice beforehand
   4. I don't think I could do better
VITA

Gloria Blanche Peterson Wood was born February 22, 1938 in Minneapolis, Minnesota. She attended public school in Minneapolis and upon graduation from Central High School received the Gale-Prize Essay Award and the Sears Robuck Scholarship. After 10 years absence from school, in which she married and had four children, she returned to college to continue her education. She attended Metropolitan State Junior College, where she received a full-years scholarship. She spent her second year at Anoka-Ramsey State Junior College, and upon graduation, received an Associate of Arts Degree. The next two years were spent at Hamline University majoring in psychology under the direction of B. R. Hergenhahn. She graduated cum laude with special honors in psychology and received the Bachelor of Arts Degree. She is a member of Psi-Chi, Pi Gamma Mu, and Phi Kappa Phi, honor societies. At Virginia Polytechnic Institute and State University she has been a graduate teaching assistant for two years. Upon graduation she will receive the Master of Science Degree. She will be attending the University of Minnesota as a Ph.D. candidate.

Gloria B. Wood
EFFECT OF LOCUS OF CONTROL AND INSTRUCTIONS ON SPEECH
PERFORMANCE UNDER DELAYED AUDITORY FEEDBACK

by

Gloria Blanche Wood

(ABSTRACT)

The present study investigated the effects of locus of control
and differential instructions on speech performance under delayed
auditory feedback (DAF). It was hypothesized that internals would
perform better under skill instructions than under chance instruc­
tions, and conversely, that externals would perform better under
chance instructions than under skill instructions. In a 2x2x2 design,
internal and external Ss received either skill or chance instruc­
tions prior to performing under DAF. The results indicated that
Internal-males under skill instructions made fewer speech errors
than Internal-males under chance instructions and that External­
females under chance instructions made fewer speech errors than
External-females under skill instructions. It was also demonstra­
ted that internal Ss take less time to complete the DAF task under
skill instructions than under chance instructions. Thus the hypo­
thesis was only partially confirmed. The results were interpreted
in terms of Rotter and Mulry's (1965) theory which attributed better
performance to motivational factors; Watson and Baumal's (1968)
theory which attributed poorer performance to anxiety; and to an
additional factor defined as an active - passive dimension.