ABSTRACT

A STUDY OF TIME AS A FACTOR
IN VOCAL PROJECTION

by Annette Jacobs

The purpose of this study is to analyze the results obtained from readings made by semi-trained speakers in order to determine the effectiveness of imposing the directive, "project" on a speaker's oral reading rate. Although the term, projection, has a wide usage among speech people there is little common agreement as to how to produce this phenomenon. It is hoped that the information gained from this experiment will enable speech teachers and/or students to gain insight into one aspect of projection, the time factor.

A search of the literature revealed that several variables may be operant when a speaker is attempting to project or increase his intelligibility. The intensity and time factors, because of their position as major determinants of intelligibility are thought to be of equal importance in projection. It has been established that increased sound pressure level is the most significant factor in projection. It has been conjectured that an increase in the time factor is also important--although conceivably of less significance

than intensity. The results of this study should lend credance to that theory.

The subjects for this study were 27 college students currently enrolled in speech courses. Each subject was recorded twice while reading an excerpt from a speech by Eric Johnston. These oral readings were done consecutively under two different conditions: (1) when no directive was given and (2) when only the request "now project" was imposed on the original instructions. Individually, each subject was familiarized with the style of the speech, but not the test passage itself, and the sound field. A time analysis was made of these recordings by using a graphic level recorder. These data were then subjected to statistical analysis.

The findings of this study indicate that the general tendency is for a speaker to utilize a longer period of time when he is attempting to project. Moreover, there is a wider spread of reading rates among speakers when they are projecting than when they are reading aloud in a conversational manner.

The conclusions which were drawn from this study suggest that a change of rate, in addition to a change of intensity, is essential for a speaker's increased intelligibility as a function of projecting. The corollary which may be drawn from this should allow for additional emphasis to be given to the time factor in projection by the student and/or teacher of speech.

A STUDY OF TIME AS A FACTOR IN VOCAL PROJECTION

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TABLE OF CONTENTS

LIST OF APPENDICES

CHAPTER I

STATEMENT OF THE PROBLEM

Introduction

Projection is a term that is used in many speech textbooks and classes; ranging, in fact, from rhetoric and public address, to oral interpretation, to theatre, and to speech therapy. In public speaking, teachers speak of a "lively sense of communication."[1] To maintain and sustain audience interest the prescription usually recommends a responsiveness to audience feedback combined with the use of vocal variety, physical vitality, and adequate projection. Much the same formula is found in textbooks dealing with oral interpretation; here, of course, more emphasis is placed on conveying the meanings and emotions of the author combined with the use of vocal variety, physical vitality, and adequate projection.

In other areas of speech one might find a therapist working with voice disorders using the term, project, as a directive to increase intelligibility. This may also

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[1]William N. Brigance, Speech (New York: Appleton-Crofts, Inc., 1952), p. 27.

be the intent of the director working with his actors while a play is in rehearsal.

Although the term, projection, has wide usage among speech people there is little common agreement among their definitions. There is even less agreement as to how to produce this phenomenon The emphasis in a definition may be placed anywhere along a continuum from the stimulus which motivates the speaker-source to the perceptual abilities of the auditor-receiver.

The writer's attempt to find the genesis of the word, projection, as a speech term, has been similar to Diogenes' search for an honest man. Early in the twentieth century Charles Woolbert did a study of the morphology of speech terminology. In his review he attempted to determine the adequacy of the speech terms then in current usage; projection, although used, was not among those listed. One of his concluding statements, "The omissions are in most cases more significant than the inclusions."[1] leads this writer to believe that the term projection, has no definite origin in the field of speech. The fact that the term is used will have to serve as its raison d'être.

It is apparent to the observer that several variables are operant when a speaker is projecting. Some research

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[1]Charles H. Woolbert, "Old Terms for New Needs," Quarterly Journal of Speech, IV (1918), pp. 296-303.

has been done in the areas of intensity, pitch, and articulation. To this writer's knowledge, time as a factor in projection has been studied only once and that in 1934 by Lynch.[1]

Hanley and Thurman,[2] in a recent text, refer to time as "a Cinderella among vocal variables." Although there has been much research in this area it is an "often-neglected factor"[3] in the study of voice and diction. They state that not only is it an important variable, but one which can easily be controlled by the student.

It will not be possible within the scope of this thesis to study all aspects of projection. The writer feels that a current investigation of the time factor in projection is long overdue, therefore, the concern herein will be with only one variable of projection, time. The assumption is made that the time factor is one of the major components in successful vocal projection; increased attention to this variable would aid the student's attempt at mastery in his study of voice and diction.

More specifically, this investigation will attempt to determine whether or not semi-trained speakers, (people

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[1]Gladys E. Lynch, "A Phonophotographic Study of Trained and Untrained Voices Reading Factual and Dramatic Material," Archives of Speech, I (1934), pp. 9-25.

[2]Theodore D. Hanley and Wayne L. Thurman, Developing Vocal Skills (New York: Rinehart, and Winston, 1962), p. 110.

[3]Ibid.

who have had at least one college speech course), demonstrate a measurable change between their reading rate when they read in a non-directed manner and their reading rate when they attempt to project.

Statement of Problem and Purpose of Study

Virgil Anderson pointed out a problem in 1953 which continues to plague the modern-day-teacher of speech. He set what might be viewed as an over-all goal for the speech discipline. "What is required [today] is a science and art of voice training in which established facts can be fully applied to the problem of building a modern, revised, and revived methodology of training the normal speaking voice."[1]

One aspect of the problem is the need for clarification of the nomenclature attached to the field of speech. The terms, in large part, are an outgrowth of traditional usages which pre-date the scientific method. James Rush, one of the leaders of the elocutionist movement in this country, was indeed perceptive when he wrote:

> The studious inquirer has therefore wanted a definite language for those purposes of the voice, which he must have always obscurely perceived. The fulness of nomenclature in art is directly proportional to the degree of its improvement; and the accuracy of its terms insures the precision of its systematic rule. . . . The words, quick, slow, long, short, loud, soft, rise, fall, and turn, indefinite

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[1]Virgil Anderson, "A Modern View of Voice and Diction," Quarterly Journal of Speech, XXXVIII (1953), pp. 25-32.

> as they are, include nearly all the discriminative terms of Elocution. How far they fall short of an enumeration of every precise and elegant use of the voice, and how fairly the cause of the vague and limited condition of our knowledge is here represented, shall be determined on a retrospective view by an age to come, when the ear will have made deliberate examination.[1]

In the interest of specificity the writer views it as essential to add any "established facts"[2] based on research of the time factor in projection. It is further hoped that these facts will aid the speech teacher and/or student in his attempts at teaching or studying projection.

The question immediately arises as to whether or not the time factor is a significant variable in projection? Assuming that time is an important attribute of projection there is a need to know how it is manifested and, further, how it can be measured? More formally the questions to be asked are two: (1) Does a speaker's rate tend to differ between conditions in which he is instructed to project and in which no specific instruction is given; is the tendency toward a decreased over-all rate while "projecting?" (2) Does the reading time vary more when speakers are attempting to project than when speakers are not trying to project?

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[1]James Rush, The Philosophy of Human Voice (7th ed. rev.; Philadelphia: The Library Co., 1893), p. 55

[2]Anderson, loc. cit.

The purpose of this study is not to attempt to find answers to all of the questions that could be raised on the subject of projection, but merely to evaluate the effect of "projected" versus "non-projected" reading on rate.

Hypotheses

The following null hypotheses will be tested in an effort to answer the above questions:

1. Reading rate does not vary between conditions in which subjects read aloud with no specific instructions and in which they are given the directive, "project."
2. The variance of the scores on the second reading (reading aloud while attempting to project) is less than or equal to the variance of the scores for the first reading (reading aloud in a non-directed manner).

Importance of Study

From reading the literature and interviewing people in the field of speech it is apparent that the confused and confusing descriptions of projection suggest the need for precise delineation of the elements which constitute the phenomenon. Certain observable differences do occur when a speaker in his role as a performer is projecting and when he is conversing in a normal manner. It is important for speech people to know specifically what is happening in order to be able to communicate this to their students.

A look at some of the definitions of projection will show that as few as one and as many as seven distinct variables are mentioned. This writer found many definitions for projection all of which differ slightly. All definitions have one thing in common--none are stated in terms which are operationally significant. An all inclusive definition is given by Gray and Wise who refer to : (1) loudness, (2) articulation, (3) force, (4) breath stream, (5) action of the vocal bands, (6) audition, and (7) intelligibility in their discussion of "projection."[1] Elizabeth Avery makes only one requirement--that a "tone must be mentally projected."[2]

"Carrying power" is a foremost consideration in the writings of several authors.[3,4,5] For some writers articulation is the main emphasis. Van Dusen says, "it plays a

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[1]Giles W. Gray and Claude M. Wise, The Bases of Speech (rev. ed.; New York: Harper and Brothers, 1959), p. 54.

[2]Elizabeth Avery, First Principles of Speech Training (New York: D. Appleton and Co., 1931), p. 257.

[3]Harriet E. Grim, Practical Voice Training (New York: Appleton-Century Crofts, Inc., 1948), pp. 89-92.

[4]Virgil A. Anderson, Training the Speaking Voice (New York: Oxford University Press, 1942), p. 150.

[5]Andrew T. Weaver, Gladys Borchers, and Donald K. Smith, Speaking and Listening (Englewood Cliffs, New Jersey: Prentice-Hall, 1956), p. 228.

vital part"[1] in projection. Andrew T. Weaver requires pronunciation that is "more deliberate and precise."[2] Many textbooks--such as Weavers'--refer to audition as the prime concern of projecting.[3] This is especially true when the material is used in an acting course.[4]

The confusion is not limited to older textbooks. A typically confusing statement is found in a new textbook by Armstrong and Brandes:

> Some interpreters confuse projection with loudness. When they are told to project, they merely get louder. A reader, however, may project satisfactorily at a relatively low volume. Experienced actors and readers learn to simulate a whisper so that it can be heard in the last row of the balcony. Therefore, it is not only the loudness of the sounds (that is, the amount of energy with which they are transmitted) but the audience reaction to the sounds (whether they are perceived as loud or soft) which determines whether or not a sound has been satisfactorily projected.[5]

It is important that the type of confusion displayed in the above definitions be abolished. It is hoped that this study--and others like it--will allow the speech teacher to add to his directive, "project," some guidelines by which this may be effectively accomplished by his students.

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[1]Raymond Van Dusen, Training the Voice for Speech (2d. ed.; New York: McGraw-Hill, 1963), p. 167.

[2]Andrew T. Weaver, Speech (New York: Longmans, Green and Co., 1951), p. 134.

[3]Ibid.

[4]Charles McGaw, Acting Is Believing (New York: Holt, Rinehart and Winston, 1962), pp. 97-98.

[5]Chloe Armstrong and Paul D. Brandes, The Oral Interpretation of Literature (New York: McGraw-Hill Co., Inc., 1963), pp. 130-131.

Definition of Terms

For the purpose of this study several terms need defining.

Projection.--Projection is operationally defined as an acoustic event occuring when a speaker is given the directive, "project."

Non-directed.--Non-directed for the purpose of this paper is defined as a reading which is done without the subject being given any directions. This term is interchangeable with "conversational" or "normal" reading. Both of these terms are found in the literature.

Over-all rate.--Over-all rate refers to the number of words per minute. This rate includes the duration of communicated sounds plus pause time, the time when there is no sound.

Organization of the Thesis

This chapter contains the statement of the problem which led to this study. It includes an introduction to the topic and an outline of the purpose of the study. It puts forth the hypotheses considered in this study, discusses the importance of the study, and defines any terms which might need clarification throughout the study.

A review of the literature is found in Chapter II. Two factors are deemed to be of special importance to

intelligibility. The intensity and rate factors because of their position as major determinants of intelligibility are thought to be of equal importance in projection. A look at intensity shows some of the research in this area. Also contained within this chapter is a review of the literature on the many facets of the duration factor: pause, phrasing, over-all time, syllable duration, and stress and emphasis.

There is a duscussion of the subjects, equipment, and testing procedures used in Chapter III. It concerns the selection of the subjects and the material used. It then details the steps followed for procurement of the data.

A discussion of the results of the study is given in Chapter IV. It includes the statistical methods employed for treatment of the data. The results of the analyses are discussed in terms of the null hypotheses which were proposed earlier in this chapter.

The final chapter contains a summary and the conclusions of the study. Based on the findings any implications for future research are enumerated.

CHAPTER II

REVIEW OF THE LITERATURE

Factors Important in Vocal Projection

It is difficult to dissect a process as complex and dynamic as projection. However, research has shown that two factors upon which speaker-intelligibility are dependent are intensity and rate. Black concludes, "The best-documented vocal accompaniment of intelligibility is sound pressure level."[1] Tolhurst,[2] Kelly,[3] and Draegart[4] in separate investigations found that duration influences intelligibility. Furthermore, findings show that the "correlation between level and intelligibility was even higher than that between duration and intelligibility."[5]

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[1]John W. Black, "The Relative Effectiveness of Brief Instructions to Achieve Loud Speech," Joint Project Report No. 37 (Pensacola, Florida: U. S. Naval School of Aviation Medicine, 1954), p. 3.

[2]G. C. Tolhurst, "Some Effects of Changing Time Patterns and Articulation Upon Intelligibility and Word Reception," Joint Project Report No. 40 (Pensacola, Florida: U. S. Naval School of Aviation Medicine).

[3]J. C. Kelly and M. D. Steer, "Revised Concept of Rate," Journal of Speech and Hearing Disorders, XIV (949), pp. 222-226.

[4]G. L. Draegart, "Relationships Between Voice Variables and Speech Intelligibility in High Level Noise," Speech Monographs, VIII (1951), pp. 272-278.

[5]Hanley and Thurman, op. cit., p. 128.

Review of Intensity Factor

The role of intensity in projection has been fairly extensively investigated; rate has not. Van Riper and Irwin cite some of the studies done in their discussion of the scientific investigations into projection.

> Singing and dramatic teachers have written and said much about "projection." We do not, however, have much adequate scientific evidence to show that projection is based upon the differential amplification of the vocal cord tone by the cavities above the larynx. We can be pretty sure that neither the hard palate nor the chest cage act as sounding boards. Lasse has shown that when the voice increases in intensity and the pitch remains constant, there is a higher percentage of energy in the higher overtones; but the converse may not be true. Talley had actors say the same material while "projecting" and "not projecting" their voices, and found that the only real difference was an increase in loudness. Projection may also be a function of better and clearer articulation. Curry and House and Fairbanks found that intelligibility decreased markedly when the subject spoke at low loudness levels. An illusion of increased loudness can certainly be produced by clearer articulation, especially of the unvoiced consonants, and by prolonging the vowels. It is also possible to produce louder voice by speaking in a "dead room," a room in which there is no reverberation, and by delaying the side tone up to .09 seconds.[1]

Talley's study, referred to above by Van Riper and Irwin, was conducted in 1937. He used seven actors who read the same material in three different ways with only a change in "intent:" conversational manner, "projecting" to an audience of 2,000 people, and in a conversational manner

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[1]Charles Van Riper and John Irwin, Voice and Articulation (Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1958), p. 260.

as if 2,000 people were in the audience. This was recorded in a "sound-treated" room. This study concerned pitch and intensity factors and the findings show that other differences[1] were obtained beside "the only real difference was an increase in loudness."[2]

> In general, when a speaker changed from conversational to the audience type of speech, three changes in the sound wave produced by his voice took place simultaneously, namely heightened pitch, increased intensity and shift of energy from the lower to higher partials. Although similar characteristic changes in sung tones have recently been observed, it does not seem possible at present to evaluate the relative importance of the three factors nor to state whether one element causally influences the other two.[3]

Other studies have been done which concerned themselves with the intensity-loudness variable. Black[4] found the best accompaniment of intelligibility is sound pressure level. He cites three effective commands: (1)"Feel the strain of shouting;"(2)"Speak just short of shouting;"(3)"Speak loudly."[5]

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[1] Infra.

[2] Van Riper and Irwin, loc. cit.

[3] C. H. Talley, "A Comparison of Conversational and Audience Speech," Archives of Speech, II (July 1937), No. 1.

[4] Black, loc. cit.

[5] R. W. Peters, "Voice Intelligibility as a Function of Speakers' Knowledge Concerning the Conditions Under Which Their Transmissions Will Be Received by Listeners," Joint Project Report No. 41 (Pensacola, Florida: U. S. Naval School of Aviation Medicine).

In research done on intelligibility during conditions of quiet and noise Peters found that advanced knowledge about the sound to noise ratio had little effect on the experienced speaker. However, he concludes the inexperienced speaker's intelligibility did improve when told he would be speaking in noise. Draegert, like Black and Peters, in working on intelligibility of military voice communications found that his "good and poor communicators were as distinguishable on the speech signal level criterion as they were on syllable duration."[1]

Review of Rate

No specific study has been conducted on only the time factor in projection. It is both rewarding and significant to take note of the research which has been done generally on the durational aspect of speech. "Time factors in speech have been respectably, even brilliantly, researched for a quarter of a century or more."[2]

Pause.--The first work of major importance was done in 1934 by Lynch who studied the rate of speech within phrases, the variability of rate within phrases, and the variability between phrases. She found that one time measure, the use

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[1]Hanley and Thurman, op. cit.

[2]Ibid., p. 110.

of longer pauses between phrases in reading various different types of material, distinguished trained from untrained speakers.[1]

Another conclusion reached by Lynch was that "experienced readers varied more and more [on phrase rates] among themselves"[2] from the first to the third passage. This is not surprising when it is remembered that "flexibility is an aid to intelligibility, to the maintenance of listener interest, and to emphasis."[3] This was further confirmed by Murray and Tiffin who, writing at the same time, found that trained speakers differ from both good and poor untrained speakers in having greater variability of pause between phrases and duration of phonation.[4]

In these early studies much emphasis was placed on the use of pause. The justification of the use of pause, as a determining factor in over-all rate, has been the subject of much controversy. Darley found that oral reading rate in words per minute varies markedly as a

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[1]Lynch, loc. cit.

[2]Ibid.

[3]Hanley and Thurman, op. cit., p. 128.

[4]E. Murray and J. Tiffin, "An Analysis of Some Basic Aspects of Effective Speech," Archives of Speech, I (1934), pp. 61-83.

function of the material read.[1] Consistent with this thinking is the study by Fairbanks and Hoaglin who found that emotions influence duration not only of phonation, but pause as well.[2]

Phrase.--The opposing view holds that phrase rate is the more significant measure. Cotton in 1934 contended that telling a speaker to slow down only resulted in longer and more pauses.[3] He said, "speech rate determinations which are made by timing a speech and calculating the average number of words spoken per minute, although useful for some purposes are practically worthless in any scientific speech study."[4] Kelley and Steer writing in 1949 agreed that phrase rate should be the important factor in determining rate per minute and they made the observation that an increase in rate accompanies a decrease in syllable duration.

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[1]F. L. Darley, "A Normative Study of Oral Reading Rate," (unpublished Master's thesis, State University of Iowa, 1940).

[2]Grant Fairbanks and L. Hoaglin, "An Experimental Study of the Durational Characteristics of the Voice During the Expression of Emotion," Speech Monographs, VIII (1941), pp. 85-90.

[3]Jack C. Cotton, "Syllabic Rate: A New Concept in the Study of Speech Rate Variation," Speech Monographs, III (1936), pp. 112-117.

[4]Ibid.

Diehl concluded from his study that rate can be altered in several ways and further that altering rate from 126 words per minute to 172 words per minute by altering pause time does not interfere with either listener comprehension or listener rating of the quality of a speaker's delivery. He found that:

> Rate can be altered by a speaker in several says: (1) by prolonging or shortening the pause time between words, phrases, or sentences; (2) by introducing new pauses, and (3) by prolonging or shortening syllables and words within phrases.[1]

Harwood confirmed findings of others that "listenability" does decrease with the increase in rate of presentation. He used tapes of stories 300 words in length and recorded four on each tape. The tapes differed from one another in that one was recorded of a speaker reading at 125 words per minute, another at 150 words per minute, a third at 175 words per minute, and the last at 200 words per minute.[2]

It seems reasonable then to accept one of the findings of a just completed study by Margaret Leitner. She says,

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[1]Charles F. Diehl, et al., "Rate and Communication," Speech Monographs, XXVI (1959), pp. 229-232.

[2]Kenneth A. Harwood, "Listenability and Rate of Presentation," Speech Monographs, XXII (1955), pp. 57-59.

"a speaker seems most continuous and even when at the near-natural rate of presentation, and he tends to stop giving this impression of evenness as his rate varied in either direction."[1]

One might conclude then that--within certain limits--pause time is not a disturbing factor in communication; moreover, that it is frequently essential for conveying meaning. If this is true the question might be legitimately raised, "What is a 'near-natural rate'[2] of reading orally?"

Over-all.--Two very important studied have been done on over-all rate. Franke did a thesis in 1939--the results of which are still accepted today as valid--in which she established an acceptable reading rate of between 140-185 words per minute. This is not incompatible with a study done by Darley the following year. Darley found that in his experiment on 300 university students, an average reading rate is 166 words per minute. Some additional observations made at that time seem significant. For his study the author constructed and used three test

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[1]Margaret Ann Leitner, "A Study of the Effects of Intrapharase Rate and Pause Time on Information Gain and Speaker Image" (unpublished Doctoral dissertation, University of Wisconsin, 1963).

[2]Ibid.

passages: (1) composed solely of monosyllabic words, (2) composed of polysyllabic words [two and two-tenths mean word length], and (3) as nearly as possible, based on average word length [one and five-tenths mean word length]. Frequency of usage was another consideration and for this determination Darley used Thorndike's "Teachers Word Book of 20,000 Words."

Darley's findings show that for the first category, monosyllabic words, the mean rate in syllables per minute is 200.7. Between the other two categories differences between the means are not great; for polysyllabic words the mean rate of syllables per minute is 253.4 and the rate for "average word length" is 251.0 syllables per minute. From this information Darley concluded that, "it is apparent that the influence of length and frequency of words is greater than has commonly been supposed. From these figures he determined that rate varies inversely with the use of syllables per minute as compared to words per minute. He states:

> These figures indicate that, as passages increased in word length and as words of less frequency were added, the rapidity of articulation was markedly increased, although a progressively slower rate of reading was recorded in terms of words per minute.[1]

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[1]Darley, loc. cit.

From his study Darley concluded that there is greater validity in using "words per minute" as a measure of oral reading rate, in preference to "syllables per minute."[1]

Other variables have been experimented with which similarly obtained a reduced reading rate. Black found in an experiment on breathing and loud voice that an accompanying effect of the task (consistent deep-breathing) was a reduced rate of reading.[2] Superior speakers favor fourteen words per breath was a finding by Snidecor who determined that seven-fourteen words are contained in most extemporaneous phrases. He found that reading rate was more rapid than speaking rate.[3]

Syllable Duration.--While it is not this writer's intention to investigate syllable duration in the current study it is important to know the research findings on this aspect. Obviously, syllable duration has its final effect on the over-all rate of oral reading. Draegerts found that, "of all voice variables tested, syllable

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[1] Ibid.

[2] John W. Black and Walter B. Tomlinson, "Loud Voice: Immediate Effects Upon the Speaker," Speech Monographs, XIX (1950), pp. 299-302.

[3] John C. Snidecor, "A Comparative Study of Pitch and Duration," Speech Monographs, XXII (1955), pp. 284-289.

duration was most highly related to speech intelligibility in high level noise."[1] Black--in a study--found that shorter syllabic duration accompanies shorter phrases.[2]

A study which tested intelligibility under three conditions of word and phrase duration was conducted by Tolhurst. He found that of the conditions used (normal, prolonged, and staccato) that staccato speech is unintelligilbe and not preferred, whereas no preference for normal or prolonged duration was expressed.[3]

The final factor to be considered in syllable duration is the use of syllable duration for emphasis and stress. Ortleb found in a study of the oral reading of dramatic and factual material that emphasized syllables have a definitely longer duration than unemphasized ones. She concludes:

> Finally the results of this study indicate that emphasis in oral reading is not a function of any one factor, but of a combination of pitch, intensity, and duration. As to the relative importance of each of these factors, no definite conclusions can be drawn. On the basis of this study, all that can be said is that in the reading of dramatic and factual material, the most and least emphasized

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[1] Draegerts, loc. cit.

[2] John W. Black, "The Relation Between Message-Type and Vocal Rate and Intensity," Speech Monographs, XVI (1949), pp. 217-220.

[3] Tolhurst, loc. cit.

> syllable are more clearly differentiated by the factors of duration and range of syllabic pitch inflection than by the factors of intensity and average pitch.[1]

In the same year, 1937, Tiffin and Steer found that in ninety-eight per cent of the readings done in their study that stressed words were of longer duration than the same words when unstressed.[2] This was ascertained by stressing one word in the context of a sentence in one reading and not stressing it in another.

Summary

The writer concurs in a hypothesis postulated by Black:

> A consideration of some importance with regard to the loud voice signal is that it may be attended by other attributes that are favorable to intelligibility. These have not yet been segregated. They may include an advantageous duration of the phoneme, improved articulation, and a favorable vowel-to-consonant ratio in level.[3]

Having ascertained that intensity does play a major role in projection it seemed wise to investigate the function of rate which might influence a speaker when he is attempting to project.

A review of the literature has shown some of the major research done on the durational factor in speech.

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[1]Ruth Ortleb, "An Objective Study of Emphasis in Oral Reading of Emotional and Unemotional Material," Speech Monographs, IV (1937), p. 56.

[2]Joseph Tiffin and Max D. Steer, "An Experimental Analysis of Emphasis," Speech Monographs, IV (1937), pp. 69-74.

[3]Black, op. cit., p. 1.

It can be said that variation in pause and phrasing distinquish experienced speakers from inexperienced speakers. It may also be concluded from the findings of the various authors that oral-reading rate exceeds the rate of speaking extemporaneously. The research shows that "words per minute" is a more valid measurement of speaking-rate than "syllables per minute." The over-all rate of speech while reading has a mean average of 166 words per minute, while the speakers judged the most effective varied in their rates from 140-185 words per minute. A speaker seems most "even" when using the established norms; when he varies in either direction he loses this effect.

Syllable duration is one of the chief determinants of over-all rate. It is used by a speaker for stress and emphasis. In high-level noise syllable duration was highly related to intelligibility.

Much work needs to be done to supplement the existing data. The contribution of time to intelligibility is one of the areas most in need of research.

> We do not know as precisely as perhaps we should how rate factors interact with articulatory skill, with the effect that one person can communicate with perfect intelligibility at 250 words per minute whereas another can be understood only about half the time when he speaks that fast.[1]

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[1]Hanley and Thurman, op. cit., p. 25.

Apart from any aesthetics which might be involved in the projection of emotionally laden material it seems wise to investigate the function of rate when a speaker is attempting to project. In order to determine what are the "contributing factors favorable to intelligibility" it first must be determined whether a significant difference in rate does occur between the conditions in which a speaker is reading aloud in a non-directed manner and in which a speaker is attempting to project. Once this general observation has been documented it will then be possible to investigate other specific changes which do occur as a function of a speaker attempting to project.

CHAPTER III

SUBJECTS, EQUIPMENT, AND TESTING PROCEDURES

Subjects

It was determined that college students should be selected for subjects in this study. A total of twenty-seven students, fourteen girls and thirteen boys, volunteered to serve as subjects. They ranged in age from eighteen years to twenty-two years, with a mean age of twenty.

All of the subjects were college students currently enrolled in a speech course at either Michigan State University or Lansing Community College. They ranked in academic status from freshman to senior--seven freshmen, ten sophomores, seven juniors, and three seniors. The minimum course work in speech was one course and the maximum was fifteen. Their platform experiences were varied. All but five had experienced some type of performance before an audience--plays, forensics, and/or singing. These were either in their own community prior to attending college or while in attendance. These subjects, therefore, were considered semi-trained speakers.

Equipment

Each subject's reading was transcribed onto magnetic tape by means of a tape recorder (Wollensak Tape Recorder, T - 1500). The magnetic tape (Scotch Magnetic Tape, number 175), was then connected to a graphic level recorder (Brüel and Kjaer, type 2305) for the purpose of making graphic tracings of each speaker's oral readings. The graphic level recorder measures intensity as a function of time. Its use in this study was originally intended to supply information which would enable the investigator to measure pause-time in addition to over-all rate. Because the S/N ratio was so low it was extremely difficult--coupled with the possibility of the findings being unreliable--to do any further measurement, therefore, the tracing was used only to study the over-all time. The graphic level tracing gives a readout of intensity through time which can then be measured by using a metric rule with--one centimeter equal to one second.

Procedure

The test passage was chosen because it was an example of extemporaneous speaking; and of such a nature that various meanings could be imposed upon it. Moreover, all of the words were found among the 30,000 most frequently used.

words in the English language.[1] The first reading was non-directed; the second reading was accompanied by the directive, "project."

Twenty-seven college students (male and female) served individually as experimental subjects and provided the oral readings in this study. Each student read the same pre-selected passage twice--in two consecutive readings.

Pre-recording.--The volunteer subject was asked to arrive at the lobby of the Fairchild Theatre (Michigan State University) at a specified time. While awaiting his turn to be recorded each subject was asked to fill out a Data Analysis Form.[2] Each reader was assigned a number corresponding to the order of his appearance at the recording site. Each subject was then asked to proceed into the recording area individually, based on his number.

Each subject, as he was ushered to the platform, was handed a typewritten excerpt of a speech by Eric Johnston.[3] He was first asked to read the introduction given in the

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[1]E. L. Thorndike and Irving Longe, The Teacher's Word of 30,000 Words (New York: Bureau of Publications, Teachers College, Columbia University, 1944).

[2]Infra, Appendix C.

[3]A. Craig Baird and Franklin H. Knower, General Speech (New York: McGraw-Hill Book Co. Inc., 1963), p. 436.

Johnston speech.[1] This was done in order to acquaint him with the style of the speech and also to accustom him to the sound field in which he would be reading.

Recording.--Recording began as the subject (placed at least eight inches from a mounted microphone attached to the tape recorder) read the test passage (the conclusion of the Johnston speech). This was a "non-directed" reading and was begun by a hand signal from the investigator who simultaneously started the tape recorder.

Instructions.--At the end of the first reading the subject was asked to re-read the passage. This time he was given the directive, "project," with no other instructions given. To enable the subject to get the "feeling" of projecting the investigator moved to the center of the auditorium. Prior to this a hand signal was given to the subject to initiate the second reading. After a subject concluded his part in the experiment he returned to the lobby of the Fairchild Theatre and asked the next subject to enter the auditorium.

Collecting data.--Each of the twenty-seven subjects was recorded twice reading this same passage. The two readings were done consecutively by each subject. Thus

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[1] Infra., Appendix B.

their recording on the tape was contained within one segment of the tape. This enabled the writer to make one continuous tracing on the graphic level recorder for each subject. There was an observable pause between the two readings occasioned by the starting and stopping of the tape recorder.

The tracing made for each subject was then measured by a metric rule. One centimeter is equivalent to one second of time. Thus it was possible to obtain raw scores for each subject for each of his two readings. The data were then available for statistical analysis.

CHAPTER IV

RESULTS AND DISCUSSION

Results

Introduction.--Before analyzing the results of the data, a review of the questions which led to this study is appropriate. The questions asked were: (1) Does a subject change his oral reading rate between two different conditions; when reading in a non-directed manner and when attempting to project? (2) Is the spread of scores greater in the second of the two test conditions than in the first?

The time required for each of the two readings described in the previous chapter was measured and recorded for each subject. The results were analyzed statistically. The purpose of the analysis was to test the following two hypotheses as originally set forth in Chapter I. (1) Reading rate does not vary between conditions in which subjects read aloud with no specific instructions and in which they are given the directive, "project." (2) The variance of the scores on the second reading (reading aloud while attempting to project) is less than or equal to the variance of the scores for the first reading (reading aloud in a non-direct manner).

Difference between mean scores of the two readings.--In order to determine the significance of the difference between the two sets of scores it was decided to subject the data to a non parametric statistical analysis. A two sample non parametric test, Wilcoxon Matched-Pairs Signed Ranks Test,[1] was used to study the distribution of scores. It was found that the sums of the ranks were not the same and that the difference ($z = -2.64$) was significant at the .01 level of confidence.[2] The findings, therefore, allow the investigator to reject hypothesis number one: Reading rate does not vary between conditions in which subjects read aloud with no specific instructions and in which they are given the directive, "project."

Difference between spread of the reading rates within each of the two conditions.--In order to determine whether the spread of scores is greater for one of the test conditions than for the other, an F test was made to find the significance of the ratio between the two variances. A standard deviation of 7.99 was found on the non-projected readings; on the projected reading a standard deviation of 10.37 was determined. The larger of the two variances was taken as a ratio to the smaller of the two. The F

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[1]Hubert M. Blalock, Social Statistics (New York: McGraw-Hill Book Co., Inc., 1960), pp. 206-209.

[2]Ibid., p. 441.

ratio for these two variances was significant at the .05 level of confidence which allowed the writer to reject hypothesis number two; the variance of the scores on the second reading (reading aloud while attempting to project) is less than or equal to the variance of the scores for the first reading (reading aloud in a non-directed manner).

Relationship between projected and non-projected reading rate.--An effort to determine the correlation between the two sets of scores was made. To determine this correlation a Pearson Product Moment Correlation Coefficient was used. A positive correlation, $r = .77$, was found between the two readings.

Discussion

The z score obtained on the Wilcoxon Matched-Pairs Signed-Ranks Test shows that a measurable change of rate does exist between the readings of material in a non-projected and a projected manner. The tendency is toward increased time for reading as a function of projecting.

The F test provided additional information relative to the spread of the scores. It is interesting to note the intra-reader differences. It was anticipated from

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[1] Ibid., p. 453.

the writer's general knowledge of learning theory (based on Mowrer's concept of "sign learning"[1]) that the subjects would increase their reading rate when reading familiar material in the second reading. However, because of the uniqueness of the situation the writer expected (based on past observation) that the subjects would show a decrease in over-all rate as a function of projecting. A look at Appendix A will show that in all cases, 12, 20, 24, 25, 26, and 27,[2] a longer time was required for the projected reading. Only two subjects, 11 and 22,[3] were consistent in rate on both readings.

The circumstances of the experience were made more unique by the use of a non-recorded introduction. This provided the subject with an opportunity to acquaint him/self with the style of the material and the sound field in which he would be reading.

Before ~~some~~ assumptions can be made from the findings of this study it would be wise to consider some of the uncontrolled variables which were operant. One must remember in studying the above data that the readings were done by subjects having varying amounts of training and platform experience. In cases with subjects accustomed to a performing situation, they may have been projecting on their first reading.

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[1]Calvin S. Hall and Gardner Lindzey, Theories of Personality (New York: John Wiley and Sons, Inc., 1957), p. 458.

[2]Infra., Appendix A. [3]Ibid.

Finally, the fact that individual differences did occur may also relate to interpretation of the term, project. A frequent question asked of the investigator when the subject was given the directive, "project," was, "What do you want me to do?" To which the investigator replied, "Do whatever you think is necessary to project." From the questioning looks directed back to the investigator, by some of the subjects, it was obvious that they were dealing with a new concept or, at best, one which was only vaguely familiar to them. A few of the subjects became interested in the experiment and requested permission to watch, unobtrusively, the efforts of the successive readers. This they were allowed to do. At the conclusion of the recordings these students inquired into the nature of the experiment which had taken place. Without divulging the true nature of the test the investigator asked them for their opinion of what variables they thought most people altered as a function of projecting. The most frequent observation concerned a change in intensity. The observers noted a change in pitch for some subjects. In only one or two cases did they mention a change in rate. These revelations were

interesting from the standpoint of subjective opinions; they become increasingly interesting in the light of the findings of the study.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

The emphasis in speech is on intelligibility. Nowhere is this more important than in the performing situation. For many years the undefined term, projection, has been used by teachers of speech and voice. They have used it to elicit from a speaker, actor, or singer increased intelligibility frequently coupled with the necessity of giving additional ethos to the message.

A review of the literature indicates that rate is one of the major determinants of intelligibility. Intensity is another important variable. Loudness and/or intensity in projection has been researched; however, until this present study, rate has not.

The purpose of this study has been to analyze one speech variable, time, in order to study the role of the time factor in projection. This information should assist speech people to offer additional guidelines when issuing the directive, "project."

Moreover, because of the ease with which this variable can be controlled by a speaker, it was felt investigation of the significance of rate in projection should

be more closely scrutinized. On this basis an investigation was undertaken.

The subjects for this study were twenty-seven college students--all of whom were currently enrolled in a speech course. A test passage was selected. This was the conclusion to a speech delivered by Eric Johnston. Each speaker was individually taken into the auditorium of Fairchild Theatre (Michigan State University) where, after familiarizing himself with the room and the style of the material to be read, he served as a subject in this experiment. He was required to read the same passage in two successive readings with only one change in the directions given. The first reading was done in a non-directed manner; the second after the subject had been given the directive, "project." The two readings were recorded on magnetic tape. A time analysis was made of these recordings by using a graphic level recorder. These measurements were then subjected to statistical analysis.

The findings of this study indicate that a significant difference does exist between the two types of readings. The general tendency is for a longer time to be utilized while projecting. In addition, a look at the spread of these two scores shows that there is a change of rate for the majority of the subjects when they are projecting.

Conclusions

Within the framework of this study the following conclusions seem tenable:

1. Semi-trained speakers tend to decrease their rate of oral-reading when given the directive, "project" in a simulated performing situation.

2. With a group of semi-trained speakers one can expect a greater variance under the condition of attempting to project than when these subjects are reading in a non-directed fashion.

3. A change of intensity--as established by other research--plus a change of rate (plus other undetermined variables), are essential for the speaker to increase his intelligibility while he is projecting.

4. One should give additional emphasis in the teaching situation to the time attribute when discussing projection.

Implications for Future Research

This study has shown that a significant difference in oral reading rate does occur as a function of projection. A further breakdown of rate could be done by using the data to determine a comparison of changes in the amount of pause time between the two conditions. Because the tape recordings in this experiment were of low signal-to-noise ratio, the tracings of the graphic level recorder would be more fruitful if the experiment were to be re-run

with emphasis on improving conditions of signal-to-noise ratio.

It is suggested that the collecting of data for this experiment could be done by having the subjects read directly into a microphone attached to the graphic level recorder. It would be possible by use of these tracings to study another possible rate change--syllable duration. If one phrase or sentence was pre-selected and marked for each subject during the recording process a time analysis of each word contained within this unit could be obtained.

Stress and emphasis have been suggested as major determinants of rate change. It might be possible by use of the data collected by the above mentioned method to analyze intensity through time and correlate the findings of these two variables.

The search for an operational definition of projection suggests other possible questions which might reveal additional information.

1. Does the time factor in projection change as a function of enlarging the sound field? What is the ratio between size of the auditorium and rate in projection?
2. Does the time factor in projection change as a function of controlling the sound to noise

ratio between ambient noise and rate in projection?

It might be conceivable that more information could be gained by use of a panel of judges who will rate speakers along a scale from one-to-nine as to the one who projected most effectively and the one who projected least effectively. The tapes made of these individuals--once scrutinized--might give significant information as the the time factor and how it is used by these individuals.

With information gained from answers to the above questions more knowledge about the nature of the time factor in projection could be acquired and utilized in its study and teaching. It is imperative that teachers of speech work within the framework of terms which have been operationally defined.

APPENDICES

APPENDIX A

READING RATES FOR THE TWO READINGS

Subject Number	Time in Seconds	
	Conversational	Projected
1	65.0	74.0
2	74.6	76.2
3	67.8	73.6
4	61.2	67.1
5	69.0	71.8
6	80.0	89.2
7	68.8	80.5
8	60.5	62.1
9	73.5	74.1
10	64.0	89.6
11	74.7	74.8
12	62.5	59.6
13	66.1	71.4
14	62.1	63.2
15	86.8	89.4
16	83.8	85.9
17	77.4	85.2
18	61.3	65.7
19	55.1	59.2
20	58.6	57.1
21	58.5	59.6
22	75.5	75.5
23	66.9	78.4
24	63.0	61.0
25	64.6	63.7
26	68.0	58.7
27	70.0	63.9

APPENDIX B

EXCERPT OF A SPEECH BY ERIC JOHNSTON[1]

Please read the following:

Introduction

I'd like to tell you now what I mean by brotherhood--and the best way to say it is to tell you what I don't mean by brotherhood.

My belief in brotherhood doesn't compel me to hold open house in my home around the clock, or go to lunch with somebody I don't like. Or go out of my way to be chummy with someone from a different church or with a different kind of ancestry.

Conclusion

We talk about building bridges of brotherhood around the world in answer to the Communist pretensions. And communism, as we all know, makes a great deal of phony fuss and feathers about the brotherhood of man.

But where does brotherhood begin? It begins on a man-to-man basis here at home and not on a mass-to-mass basis across the oceans. Without that footing, a bridge of brotherhood is idle talk and empty vision. And ours is just as phony in the eyes of Asia as the Communists'.

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[1]A. Craig Baird and Franklin H. Knower, General Speech (New York: McGraw-Hill Bood Company, Inc., 1963), p. 196.

Ahead of us all is the job of trying to make our democracy work better than it ever has, for it's got to if it's going to last; ahead of us is the job of proving to ourselves and to the world that the greatest experiment of all time--the American system--works for the good of all Americans: that it has justified the faith and hope of all mankind.

That's the kind of society men have been groping for through all the ages. It is here, if we want it to be here--the great and good beginning of a universal brotherhood of men.

APPENDIX C

DATA ANALYSIS FORM

NAME: _____

AGE: _____ SEX _____

BIRTHPLACE: _____

COLLEGE STATUS: Freshman--Sophomore--Junior--Senior--
Graduate

NUMBER OF COLLEGE SPEECH COURSES: _____

YEARS OF SPEECH TRAINING IN HIGH SCHOOL: _____

FORENSIC "MEETS" YOU HAVE PARTICIPATED IN AND ANY HONORS YOU HAVE WON:

PLAYS IN WHICH YOU HAVE APPEARED: TYPE OF ROLE.

DO YOU SING? TRAINING:

PRIVATE DRAMATIC WORK:

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