

A STUDY OF THE EFFECTS OF COMPRESSED SPEECH
ON THE LISTENING COMPREHENSION OF COMMUNITY COLLEGE
STUDENTS

by

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TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	ii
LIST OF TABLES	v
LIST OF FIGURES	vi
CHAPTER	
1 INTRODUCTION	1
Purpose of the Study	4
Need for the Study	4
Organization of the Study	7
2 REVIEW OF THE LITERATURE	9
Compressed Speech	9
Characteristics of the Developmental and Non- Developmental Community College Student	26
Summary	29
3 RESEARCH METHODOLOGY	33
Population	33
Sampling Procedure	33
Development of the Treatment Material	34
Preparation of the Treatment	36
Development of the Instrument	37
The Pilot Studies	38
Procedures of the Experiment	40
Data Treatment	45
4 ANALYSIS OF THE DATA	49
Analysis of the Hypotheses	51
Summary	55
5 SUMMARY, DISCUSSION, AND RECOMMENDATIONS FOR FURTHER STUDY	56
Summary	56
Discussion	58
Recommendations for Further Study	64

TABLE OF CONTENTS (continued)

	Page
BIBLIOGRAPHY	67
APPENDIX A--GLOSSARY	83
APPENDIX B--DEVELOPMENTAL STUDENT PLACEMENT PROCEDURE	86
APPENDIX C--LETTER OF PERMISSION FROM HARPER & ROW	88
APPENDIX D--INFORMATION REGARDING THE TREATMENT MATERIAL	90
APPENDIX E--THE TREATMENT MATERIAL POST TEST AND DELAYED POST TEST	92
APPENDIX F--PILOT TWO STUDENT INFORMATION FORMS	102
APPENDIX G--INSTRUCTIONS GIVEN STUDENTS IN THE EXPERIMENTAL GROUPS	105
APPENDIX H--SUBJECT ATTRITION	108
APPENDIX I--DEMOGRAPHIC DATA FOR DEVELOPMENTAL STUDENTS	110
APPENDIX J--DEMOGRAPHIC DATA FOR NON-DEVELOPMENTAL STUDENTS	112
APPENDIX K--GRAPHIC REPRESENTATION OF THE DECLINE IN LISTENING COMPREHENSION FOR A COMPRESSED SPEECH PRESENTATION BY TREATMENT TYPE	114

LIST OF TABLES

Table		Page
1	Summary Table of the Lindquist Type III ANOVA with Repeated Measures	52
2	Mean Scores and Standard Deviations on the Post Test and Delayed Post Test	54

LIST OF FIGURES

Figure	Page
1 Illustration of the 3X2X2 Factorial Design for the Three-Way Analysis of Variance with Repeated Measures for Post Test and Delayed Post Test Scores	46

Chapter 1

INTRODUCTION

Reading and listening are the primary means of providing learning experiences for students of all educational levels. Compared to reading, listening activities are so pervasive that one is unlikely to estimate with accuracy the amount of time spent in listening. Until the first decade of this century little research was done regarding the amount of time that individuals spend listening.

Since that time various researchers have conducted studies to assess the amount of time spent in the four processes of communication: listening, reading, talking, and writing. Rankin (1926, 1930) found that an adult sample spent 45% of their time listening, 16% reading, 30% talking, and 9% writing. Wilt (1950) studied elementary school children and found that 57.5% of their time was spent in listening. Bird (1953) assessed the records of female college students and determined that 42% of their time was spent in listening. The results of past research indicate that while most educational activities have dealt with oral instruction, much less is known about the skills required for good listening.

One early researcher (Nichols, 1949) stated that the design of instructional experiences provided through listening was inefficient since most people are capable of assimilating material faster than it

can be presented in normal spoken form. Nichols noted that the resulting effects of inattention and boredom decrease the individual's performance on oral comprehension tests.

More recently, Arrasjid (1973) indicated that the importance of good listening skills cannot be minimized. Arrasjid stated that good listening skills are necessary to improve conversation which is dependent upon communication interaction. Good listening is also important to enhance understanding of instructions provided through the aural mode. Minimally good listening calls for critical and discriminating receptor skills, as well as mental awareness.

During the 1940's researchers developed techniques for increasing the rate at which auditory verbal material could be presented. These techniques were referred to as compressed speech. In line with Nichol's theory, researchers such as Fairbanks, Guttman and Miron (1957) hypothesized that increasing the presentation rate would increase attention and concentration on the message being presented and thus increase comprehension. Results of their research confirmed their beliefs and encouraged further research by others.

To date compressed speech has been used as a means of providing audio instruction to the blind, used as an audio aid, and used in research activities to assess the perception of language (Foulke & Sticht, 1969).

Research involving the use of compressed speech has been ongoing since the late 1930's when Goldstein (1940) experimented with playing records at various speeds and measuring comprehension. The sophistication

of the electronic hardware and the quality of the research methodology have been improved since that time (Duker, 1974).

A review of the literature indicates that a substantial part of the studies involving compressed speech were undertaken prior to the development of the mass marketed compressed speech tape recorder. Studies undertaken prior to this time have relied upon the process of increasing the speed of regular tape recordings which produces the "Donald Duck" effect and lowers intelligibility. Other studies have used the laborious and tedious process of cutting up audio tape to delete specific passages (Garvey, 1953), or have used highly complex and experimental equipment not readily available to educators (Fairbanks, et al. 1957).

Although the literature did not provide clear conclusions regarding intelligence and ability to comprehend compressed speech (Foulke & Sticht, 1969), the correlation of listening and reading ability has been determined (Ross, 1964 and Brown, 1965). As community college students are classified on the basis of their performance on a standardized reading comprehension test, the inclusion of students classified as to their reading skills in a study to measure comprehension of compressed speech would serve as a further analysis of the perceived relationship between reading and listening comprehension.

As Nichols (1957) and others became extremely interested in research involving listening comprehension, various studies involving recall of material presented to college students were undertaken.

In a study that has been replicated, Nichols discovered that only 25% of information presented orally was retained beyond a one week period subsequent to treatment. Studies by Koppenaal (1963) and Slamecka (1966) found a loss of 50% of material previously learned after a twelve day period following instruction. Few studies involving listening comprehension of compressed speech presentations have incorporated delayed recall.

Purpose of the Study

The purpose of the study was to investigate the effects of various rates of compressed speech presentation upon the listening comprehension of select groups of community college students. The primary objectives of the study were to determine the degree to which developmental and non-developmental community college students could retain factual and inferential information from an uninterrupted forty minute presentation which then was compressed to various rates.

Specifically, the following research questions were considered:

1. Will there be any difference in comprehension of an extended audio presentation in various compressed or uncompressed versions?
2. Will there be any difference in comprehension between community college students classified as developmental or non-developmental?
3. Will there be any difference in recall of information by treatment type and student type over time?

Need for the Study

Few studies have utilized subjects who were exposed to realistic listening sessions. Frequently researchers have relied upon standardized listening tests as the content for treatment (Gore, 1968; Jester & Travers, 1965; Michel, 1970 and McCracken, 1971). Adelson (1972)

in her review of the research regarding treatment length, stated that the use of these tests for treatment material was questionable from the standpoint that the tests are comprised of unrelated passages varying in length from 25 seconds to less than ten minutes. In such tests, each passage is generally followed by a written test of comprehension. Similarly, Lorge (1950) critiqued the Sequential Test of Educational Progress (STEP) Listening Test on the same basis. He reported that ". . . in terms of the objectives stated by teachers and educators, such tests make for relatively short listening comprehension situations. Among high school and college students the expectation should be for significantly longer listening time and (tests should) contain more questions" (p. 527).

In terms of learner characteristics, compressed speech studies have assessed the degree of listening comprehension demonstrated by subjects of various intelligence levels, reading and listening skills (Foulke & Sticht, 1969; Duker, 1974). Few studies were available regarding the degree of listening comprehension demonstrated by the adult remedial student. One exception was Robertson (1977) who determined that there was no optimal compressed speech rate manifested for the subjects as a whole or for subjects stratified according to reading ability. She also determined that the listening comprehension of these subjects did not seem to be affected when presented recorded instructional materials within two reading grade levels below, and three grade levels above their particular reading level. According to Robertson, further research concerning the effect of compressed speech instruction upon adult remedial students should be conducted.

A final gap in the literature is that few studies have investigated recall of compressed speech information over time. Foulke and Sticht (1966), Friedman, Orr, Freedle, and Norris (1966), and George (1970) determined that more rapid forgetting occurred at the lower rate of compression, and that the decrement scores at the higher rate were virtually the same as for the control groups. It must be noted that each of these studies used relatively short, unrelated passages as treatment material. Cicardo (1974) determined that retention lessens as the time interval increases between the post test and the delayed post. However, the variables of intelligence level, rate of compression, and retention interval in combination did not significantly interact to influence retention of the compressed speech message. Since the subjects who participated in the study were junior high school students, research results cannot be generalized to other age groups.

A summary of the specific rationale for the study is as follows:

- (1) Additional research needs to be conducted in general compressed speech research since the development of the highly sophisticated mass-marketed compressed speech tape recorder has occurred within the last seven years.
- (2) Few studies have been conducted regarding the degree of comprehension shown by college students who have listened to an uninterrupted presentation in excess of thirty minutes.
- (3) Little research has been conducted regarding the ability of the adult remedial student to comprehend compressed speech. No known research has utilized developmental community college students.

(4) Delayed post tests have been omitted from studies where students have been exposed to longer treatments. The knowledge of the long range effects of the treatment is vital if compressed speech is to be utilized in higher education.

(5) Listening laboratories are available at the community college and university level. There is a need to make effective use of these facilities and of learner time. This is particularly vital at the community college level given its growing proportion of part-time students who are employed on a full time basis. This necessitates further experimentation to determine what effects compressed speech has on students in higher education.

Organization of the Study

Specific terms used in this study are defined in Appendix A or Glossary. The succeeding chapters are organized in the following manner.

Chapter Two is a review of the literature pertaining to this study, the hypotheses, and the experimental design. The literature review is presented in two sections: compressed speech, and characteristics of the developmental and non-developmental community college student. Chapter Two concludes with a summary of pertinent literature.

Chapter Three contains a discussion of methodology for the dissertation. The methodology includes: population, sampling procedures, development of the treatment material, preparation of the treatment, development of the instrument, the pilot studies, procedures of the experiment, and the data treatment.

Chapter Four contains an analysis of the data, and the results of the study.

Chapter Five consists of a summary, discussion, and recommendations for further research.

Chapter 2

REVIEW OF THE LITERATURE

The experiment sought to determine if developmental and non-developmental community college students can comprehend an audio tape presentation in compressed form as well as in un-compressed form. As a result, two main areas of concern were addressed in the review of the literature. These topics are as follows: (1) compressed speech and (2) the differences in characteristics of community college developmental and non-developmental students. A summary of the literature review as it pertains to the study is presented.

Compressed Speech

The following topics pertaining to compressed speech were reviewed: types of compression, amount of compression, method of compression, difficulty of material, retention interval, length of presentation, sex of the narrator, practice and introductory method, and listener variables affecting the comprehension of compressed speech.

The development of the technique known as compressed speech (speech in which the word rate has been increased) was first reported in the research during the 1930's and 1940's. This phenomenon has also been referred to as accelerated speech or time compressed speech. Originally, interest in compressed speech was generated as a result of

its ability to reduce the amount of time in which a message is sent through a channel. One of the most important findings of the early research was that as the rate of presentation increased, so did the rate of learning. Rippey (1975) indicated that this finding has been frequently replicated. Interest in compressed speech was further generated for its application to the visually impaired. Listening to compressed speech provided a method whereby the blind could keep pace with the visual reading rate. Compressed speech has also been applied as an audio aid in general education, and as a research device for studying the auditory perception of language (Foulke & Sticht, 1969). The review of the literature on compressed speech deals with the various techniques for compressing speech, factors affecting the comprehension of compressed speech, and the characteristics of the listeners who are exposed to compressed speech instruction.

Early researchers utilized the technique of speaking rapidly in an attempt to accelerate the speech rate. While this method is simplistic and requires no special equipment, its practice created undesired changes in vocal inflection and fluctuations in rate. The method was seen as particularly undesirable because of the relatively limited rate speakers could achieve. Research in rapid speaking by Calearo, Lazzaroni, de Quiros, Stolurow, Fergen and Goldstein is cited in Foulke and Sticht, (1969).

In early experiments, compressed speech was prepared by reproducing a recording at a different tape or record speed than used to make the

original recording. While this method is relatively simple to produce, the vocal pitch and intelligibility of the recording were affected. Researchers have referred to this occurrence as the "Donald Duck effect." Foulke and Sticht (1969) report that studies by Fletcher, Foulke, Garvey and others used this technique in several research proposals. The limitations of the "speed changing" technique generally negated research findings.

The tape sampling method was first demonstrated by Miller and Lichlider in 1950 and was accomplished by deleting segments of the speech signal. The researchers used a switching device that turned off the speech signal periodically. The interrupted speech was easily understood when the signal was not interrupted more than ten times per second. Garvey (1953) performed further experimentation in compressed speech by editing out segments of the audiotape and splicing the ends of the retained tape together. While Garvey's experimentation proved successful, his technique was deemed too cumbersome except for research purposes.

In response to the purely experimental approach taken by Garvey (1953), Fairbanks et. al. (1954) produced an electromechanical apparatus which allowed both the expansion and compression of recorded tape. The Tempo-Regulator as developed by Fairbanks and his associates sampled every speech sound in the original recording. The advantage of this approach was that time compressed speech was reproduced without altering the vocal pitch of the speaker. However, the experimental nature and expense limited the marketing of the device.

Technological developments in the decade of the sixties improved the technique which had been developed by Fairbanks and his associates. Scott (1965) utilized a computer to dispose of empty time intervals between words and to sample the time interval occupied by words differentially. While the computer proved to be the most satisfactory method of producing compressed speech, the element of expensive computer time negated the application of this approach for other than experimental purposes.

Engineering developments of the last decade have enabled the mass marketing of the all electronic speech time compressor/expander tape recorder. In 1972, the Lexicon Corporation introduced the Varispeech I. This recorder utilizes a micro-computer circuit which electronically compresses speech by selecting out milliseconds from the audiotape. Pitch correction is accomplished by use of micro-computer circuits. The development and marketing of this relatively inexpensive audio cassette tape recorder reflects the current state of the art in compressed speech technology. Further information regarding the operation of this equipment is covered in Chapter Three.

The compression of speech accelerates the presentation rate of the message. Numerous studies have varied the rate of compression and measured the resulting comprehension by subjects participating in the study. Fairbanks et al. (1957) found little difference in comprehension of listening selections compressed to 141, 201, and 282 words per minute. Diehl (1959) determined that listening comprehension was unaffected by

changes between 126 and 272 words per minute. Fairbanks et al. (1957) defined comprehension as the percentage of test questions answered correctly. Comprehension declined from 58% at 282 words per minute to 26% at 470 words per minute, a level of near chance probability. Foulke (1962) used both literary and technical presentations and found that listening comprehension was slightly higher in the 175 to 272 word per minute range. Within the 272 to 375 word per minute range an accelerated loss in listening comprehension occurred. Foulke and Sticht (1967) measured a 6% loss in comprehension between 225 and 325 words per minute, and a loss of 14% between 325 and 425 words per minute. These and other subsequent studies indicated that as word rate is increased beyond a normal rate, there is a moderate linear decline in comprehension (Carver, 1973). (It must be noted that the analysis of other intervening variables is necessary before a determination of the optimum degree of compression is made (Duker, 1974).)

McLain (1962) and Foulke (1962) compared listening comprehension by subjects who heard listening selections compressed by both the sampling and speed changing methods, and found a slight statistical advantage for the sampling method. Foulke (1966) found no statistically significant difference in favor of either method when the treatment was administered to blind students. In a later study, Foulke and Sticht (1966) indicated that the superiority of the sampling method is apparent when the comparison is made on the basis of word intelligibility.

Most researchers have determined that the ability of subjects to comprehend compressed speech instruction is dependent upon the degree of difficulty of the material. Foulke et al. (1962) determined that the comprehension of a scientific selection was less than the comprehension of a literary work at normal speed. At various levels of compression, Foulke found that comprehension scores of the scientific selection declined less than those for the literary selection. This phenomenon may be explained on the basis that, since the comprehension scores for the scientific selection were lower at the normal rate, the range in which they could vary was relatively smaller (Duker, 1974). Fairbanks et al. (1957) investigated the effect of time compression on messages of various difficulty levels. In this circumstance the conclusion of the study seemed to indicate that, within the range explored, listening comprehension did not depend upon the difficulty of the listening material. Goldhaber (1967) and Reid (1968) conducted experiments somewhat similar to Foulke's with the finding that comprehension decreased as word rate increased, and that simplified material was better comprehended than more difficult material. George (1970) indicated that although simplified materials were accompanied by some initial forgetting, the amount of forgetting with the passage of time was less than with more difficult material. Finally Sticht and Glasnap (1972) determined that low aptitude men learned easier material better than more difficult material as a function of decreased speech rate. High aptitude men tended to learn material best at 175 words per minute, independent of difficulty level.

Few studies involving listening comprehension of compressed speech tapes have measured delayed recall. The authors did not appear to be in consensus regarding effects of compressed speech on delayed recall. Foulke and Sticht (1966) had junior high school students listen to prose material at various rates of compression. Forgetting occurred more often at 175 words per minute and 225 words per minute than other rates. Time intervals in the study were immediate, 7 days, and 25 days. Foulke (1966) indicated that forgetting is not unique in the recall of information presented at accelerated word rates. Friedman et al. (1966) conducted retention studies using college freshmen and sophomores at speeds ranging from 175 to 475 words per minute. After a thirty day delay, the post test was administered again. The authors reported that the retention for the two highest rates, 425 and 475 words per minute, were 117 percent and 90 percent respectively of their first session scores. These authors reported that information presented in compressed format is retained as well as information which has not been compressed. George (1970) undertook a study involving various rates of compression and two levels of material difficulty. George determined that there was more forgotten at the lowest levels of compression in a delayed measurement, one day and one week following treatment. George also discovered that the decrement score at the highest rate was virtually the same as that for the control group who received no instruction. George stated that little comprehension had occurred at the higher rate, and thus little forgetting could occur. In other research,

Cicardo (1974) measured retention of junior high school students after one day, one week, one month, and two months, and concluded that retention lessens as the time interval increases at all rates of compression. Barry (1976) conducted research with junior high school students classified as exceptional. Using speech compression and expansion, the author concluded that the speed of the audio presentation did not significantly affect the degree of delayed concept retention shown by students two weeks and five weeks following treatment.

The literature was searched extensively for studies regarding the length of the presentation serving as treatment material. Prior to 1970, no studies known to this writer utilized non-literary material in excess of twenty minutes for treatment purposes. Adelson (1972) has criticized earlier research for its general dependence upon standardized listening comprehension tests as treatment material for all age levels. Eckhardt (1970) used a one hour multi-media presentation compressed to various rates in providing instruction to Air Force recruits of varying aptitudes. Eckhardt concluded that test differences between the groups were due to aptitude and aptitude and rate interaction. There appeared to be a high comprehension loss for low aptitude subjects at the higher compression levels. Adelson (1972) conducted a study to determine the degree of comprehension shown by a group of college students when listening to a one hour lecture on English history at 175 words per minute, as compared with the degree of comprehension shown by the same group of college students when listening to an equated one hour lecture at a time

compressed rate of 275 words per minute for 40 minutes. The author concluded that the length of stimulus materials used appears to be a critical issue. Time compressed materials suffered a proportionately larger loss of comprehension than did the normal rate materials when the longer length treatment was used. Adelson suggested that future studies should concentrate on the establishment of what might be considered to be an appropriate length for the treatment materials. Godwin (1973) conducted a study measuring improvement of reading skill using a series of twenty one presentations which were compressed using the speed changing method. The author concluded that the control groups demonstrated less comprehension than the experimental group which heard the tapes recorded at 3.75 inches per second and played at 7.5 inches per second. No other studies utilizing extended treatment periods have been located. Given the lack of studies utilizing extended treatments, conclusions could not be drawn regarding their impact on the comprehension of compressed speech.

Foulke and Sticht (1969), in their comprehensive review of the literature, stated that narrators of both sexes differed in vocal pitch, and in general varied in regard to average word rate, variation in word rate, pitch, and loudness. These factors combined to determine the individual's personal oral reading style. Foulke (1966) conducted a study which analyzed the extent to which these factors interacted with word rate in determining listening comprehension. Three versions of a listening selection were presented by narrators of both sexes to college students at normal and compressed rates. Significant differences in

scores on a listening comprehension test were associated with the word rate variable, but the narrator's effect on listening comprehension did not depend upon the word rate at which the selection was presented. Rossiter (1972) conducted a study using college undergraduates who heard short informative messages recorded by both male and female presenters. Students were tested on the content of the messages. Data analysis showed a significant difference between the statistical interaction of the sex of the speaker and the sex of the listener. The author felt that this interaction accounted for very little of the total variance and dismissed its importance. Rossiter then concluded that the sex of the speaker was not of much consequence in determining the listening scores of subjects participating in the study. According to Foulke and Sticht (1969), some voices and reading styles withstand the ravages of time compression better than others.

Numerous experiments have been conducted regarding methods of practice and introduction to compressed speech presentations. The ultimate aim of the researchers has been to provide adequate training experience prior to experimental treatment in order to improve comprehension of the treatment material. Voor and Miller (1965) exposed subjects to five brief listening sessions at 380 words per minute. Analysis of multiple choice test scores indicated that comprehension increased as a function of exposure up to seven minutes, and remained constant thereafter. Foulke (1966) gave blind children over twenty five hours of exposure to speech at 350 words per minute.

The distribution of pre-training and post-training test scores was not significantly different. In a second condition of the same experiment, Foulke interrupted the treatment. Subjects were questioned about the material just heard. The distribution of pre-training and post-training test scores were not significantly different. The third and fourth sections of Foulke's experiment provided a gradual increase of the word rate to the desired level of compression with and without interruption for questioning. Again the results were reported as being the same. In neither case were the pre-training and post-training test scores significantly different, so no particular training method was any more effective.

Orr, Friedman, and Williams (1965) conducted an experiment which provided blind subjects with a training experience that consisted of exposure to listening material presented initially at 325 words per minute and increased in 25 word per minute intervals to a rate of 475 words per minute. Subjects were tested for listening comprehension at 475 words per minute, and a comparison was made of their post test training test scores with equivalent pre-training test scores. An improvement of 29.3 percent was noted. As no control group was used, the authors concluded that the improvement that was found may have been due to a consequence of listening practice.

Friedman, Orr, Freedle, and Norris (1966) compared the comprehension test scores of subjects given thirty five hours of mass practice in listening to compressed speech with test scores of subjects given 14 to

21 hours of distributed practice in listening to compressed speech. The authors concluded that the comprehension of the distributed practice group was as good or better than the comprehension demonstrated by the mass practiced group. Rocco (1969) stated that the addition of various pause intervals within the presentation did not improve comprehension scores by the subjects. Duker (1974) in his three volume series review of compressed speech research concluded that prior research indicates that no one method is better than another in introducing compressed speech to subjects who participated in compressed speech instruction.

Other studies conducted subsequent to Duker's review of the literature appear to substantiate this. Langhoff (1973) determined that sentences with cues composed of repetition of key words did not increase comprehension. Gaddy (1975), using prompting and feedback techniques with undergraduate education students, determined that these variables did not create significant differences between post test scores which measured comprehension. Bruns (1978) sought to identify the effects of repeated daily listening practices in the compressed recorded English composition to comprehend a certain passage. The analysis of the data indicated that no statistical difference was found in comparing the criterion performances of the subjects among groups, across groups for proficiency level, or for interaction between groups and proficiency levels. Duker (1974) stated that the introductory method of gradually increasing the word rate may have some benefit on comprehension of compressed speech. Klavon (1975) incorporated this technique in his research in an attempt to provide

a controlled transition period for listeners*who participated in an experiment. Overall no particular method of introduction or practice appears to be any more effective than another in the comprehension of compressed speech.

Previous researchers have sought to determine whether specific learner characteristics have influenced the comprehension of compressed speech. Some of these variables included the subjects' sex, age, intelligence, and reading ability.

Duker (1974) indicated that the comprehension test scores of male and female subjects have revealed no sex-related differences in the comprehension for word rates varying from 174 to 475 words per minute. This conclusion had also been drawn from previous research studies conducted by Foulke and Sticht (1967) and Orr and Friedman (1964). Other researchers have drawn the same conclusion as Duker (1974) for experimental treatments given subjects of both sexes: Langford (1968), Ross (1964), McCracken (1971), Bell (1969), Ludrick (1974), and Klavon (1975).

Fergen (1954) and Wood (1966) found a positive relationship between age and grade level of school children and their ability to comprehend compressed speech. These experiments included grades 1, 3, 4, and 6. Goldhaber (1970) conducted a study to determine the ability of students at two different levels to comprehend compressed speech. The data obtained were test scores representing the number of correct answers to a test of factual recall. An analysis of

variance revealed significant differences between junior high school students and college freshmen and sophomores. Goldhaber commented that although the inference might be made that junior high school students listen better than college subjects, these differences may be attributed to the interest level of the message which was presented and the level of motivation for each population. Duker (1974) appeared to be in agreement with Goldhaber as he stated that the effects of age and education on the comprehension of compressed speech cannot be generalized. Duker further stated that the inclusion of other intervening variables does not allow the outcomes of the studies to be based solely on age or educational level. Lysaght (1969) conducted a study involving elderly, middle aged, and young adult subjects. He determined that the young adult and middle aged subject performed better than elderly subjects on a post test measuring comprehension of compressed speech. Duker (1974) cautioned researchers that the decline in the ability to comprehend compressed speech may be a result of ". . . involuntional changes in the central nervous system" which accompany old age, as opposed to the variable of age, per se. (p. 494).

Researchers appear to be in disagreement regarding the correlation of intelligence and the ability to comprehend compressed speech. Foulke and Sticht (1969) concluded that evidence at that date was not available to make a conclusion regarding the effect of intelligence on the comprehension of compressed speech. Fergen (1954) found no relationship between the IQ of grade school children and their ability to comprehend

compressed speech selections. Wood (1966) found no relationship between IQ of children in the primary grades and their ability to follow instructions conveyed by short imperative time compressed statements. Wood's conclusions have often been criticized because his testing procedures more closely measured intelligibility than comprehension.

Other studies by Fairbanks (1957), Goldstein (1940), and Nelson (1948) have found a positive relationship between intelligence and the ability to comprehend compressed speech. Fairbanks and Goldstein concurred in showing a positive relationship between listener intelligence and the decline in listening comprehension as the word rate increases. Eckhardt (1970) studied the effects of compressed speech instruction on both low and high aptitude Air Force recruits. He found that scores on tests of listening comprehension differed significantly as a function of subject aptitude and aptitude and presentation rate interaction. There was a high comprehension loss for low aptitude subjects at high rates of speech compression. Cicardo (1974) sought to determine what significant difference existed in retention of a compressed speech message presented to junior high school students of various intelligence levels. Cicardo determined that IQ level affects factual retention of material presented. (There was a statistically significant difference between the test scores of low and high intelligence subjects.) However, there appeared to be no interaction of the variables of time of testing, IQ, and rate. Ludrick (1974) conducted a study involving college students of low and high achievement levels and determined that students

in the high achievement group scored higher on the post test utilized in the media course.

Foulke and Sticht (1969) cautioned researchers about drawing generalizations from previous studies involving compressed speech in which intelligence is a variable. Foulke and Sticht stated that the positive relationship shown between listener intelligence and the degree of decline in listening comprehension may be attributed to the fact that since intelligent subjects earn higher scores than less intelligent subjects, the scores earned by more intelligent subjects on the tests of comprehension have a wider range of variance. It is for this reason that Foulke and Sticht (1969) and Duker (1974) stated that the difference in intelligence level cannot be attributed directly to the ability to comprehend compressed speech.

Goldstein (1940) and Orr, Friedman, and Williams (1965) conducted research to determine whether fast readers were able to comprehend compressed speech at a faster word rate than slow readers. In both experiments, a positive correlation was found between reading rate and ability to comprehend compressed speech. Both studies further determined that practice in listening to compressed speech resulted in an improved reading rate. Goldstein (1940) and Jester and Travers (1965) compared the comprehension resulting from listening to various selections presented at various rates of compression, with the comprehension resulting from reading the same selections, presented at the same word rates. Listening comprehension was superior to reading

comprehension to approximately 200 words per minute. Above 200 words per minute reading was superior. Simultaneous reading and listening at 350 words per minute resulted in better comprehension than could be demonstrated by either mode of presentation alone. Duker (1974) stated that previous research findings tend to emphasize the compatibility of the reading and the listening process.

Research conducted since Duker's review of the literature (1974) appears to support this belief. Breed (1977) conducted a study utilizing adult students enrolled in a vocational technical school to determine the differences in listening comprehension when subjects were categorized according to reading ability. The author investigated the relative effectiveness of the controlled reader and the speech compressor in teaching reading skills. Conclusions generated from the study indicated that neither the controlled reader nor the speech compressor was more effective in improving reading rate and comprehension. The subjects in Breed's study listened to tapes which were time expanded and time compressed varying in rate from 60 to 240 words per minute. The analysis of the data for the study indicated that there was no optimal rate for subjects as a whole or when classified by reading ability. Breed (1977) indicated that listening comprehension and reading ability appear to be related to verbal skills. Poorest readers exhibited the poorest listening comprehension, and better readers were better listeners as measured by scores on tests of listening comprehension. Robertson (1977) stated that the

comprehension of subjects does not appear to be affected when they are presented recorded instructional materials within two reading levels below or three reading levels above their particular grade level. The overall review of the literature indicates that there is a direct relationship between subjects' reading ability and ability to comprehend compressed speech.

Characteristics of the Developmental and Non-Developmental Community College Student

The developmental student is unique to the community college given its "open-door" policy. Community colleges seek to recruit all students regardless of ability level, and seek to provide instructional opportunities commensurate with student entry level. Campbell (1976) indicated that these individuals entering the community college with deficient skills in math and English are often identified as "under-prepared", "high-risk", and "remedial".

There is a need to recognize the numbers of developmental students in proportion to the total enrollment of the community college. O'Banion (1971) citing data from a report of the Junior Community College Task Force in 1969, reported that 70-75% of all students in two year colleges were either in remedial or compensatory programs. These students appear to be a significant component of community college enrollees. Eight years later, Hardison (1977) indicated that nearly 12% of the Virginia Community College System's Fall quarter 1975 enrollment was composed of developmental students. This represented more than seven thousand students.

Various researchers have conducted studies in which the unique characteristics of the community college developmental student have been identified. Nason (1958), Combs (1964) and Gallagher (1969) identified the developmental student as an underachiever with a poor self-concept. Roueche and Kirk (1973) indicated that such students generally have a poor high school transcript and are deficient in language and mathematics skills. Developmental students generally have poor motivation and study habits and are frequently the first students in their families to attend college.

Previous research also indicated that non-academic factors have been related to the developmental student's lack of achievement (Hardison, 1977). Tyler (1969) stated that the intelligence test of scholastic aptitude seldom correlates with school achievement to a greater extent than .60. Non-academic and intellectual variables identified by Abell (1970), Rosenthal and Jacobsen (1968), and Jeter (1975) have specified that such factors as low teacher expectation and systematic discrimination in favor of better students may account for the performance of the developmental student.

The non-developmental student differs considerably in comparison with the developmental college student. Unlike the developmental student, the non-developmental student is not restricted in regard to registration for non-credit courses. The non-developmental student exhibits higher academic achievement in his high school classes, and

has a higher grade point average. The non-developmental student scores higher on the Scholastic Aptitude Test and other pre-entrance college examinations when compared to the developmental student (Roueche and Kirk, 1973). The non-developmental student also scores higher on aptitude and reading comprehension tests (Hardison, 1977). The non-developmental student is typically more self-confident and has a better self concept (Moore, 1970). This student is more likely to have particular career goals as compared to the developmental student. These characteristics of the developmental student indicate the differences in learner attributes when compared to those of the non-developmental student.

The community college developmental student was incorporated into the study in an attempt to determine whether this type of student could comprehend compressed speech as effectively as the non-developmental student. Although the review of the literature did not provide clear conclusions regarding intelligence and ability to comprehend compressed speech (Foulke & Sticht, 1969), the correlation of listening and reading ability has been determined. Several studies conducted in the 1960's reported high correlation coefficients between reading and listening ability. Ross (1964) found a coefficient of .74. Brown (1965) found coefficients of .82 at the fourth grade level, .76 at the fifth grade level, and .77 at the sixth grade level. A word of caution is given by Duker (1965) who indicated that any research finding is

subject to question until instruments to measure "pure listening ability" can be developed. Participation by developmental and non-developmental students served as a further analysis of the perceived relationship between reading ability and listening comprehension.

Summary

Compressed speech instruction has been proven as an effective method of increasing listening comprehension in specific applications. Compressed speech research findings compiled by Foulke and Sticht (1969) and Duker (1974) demonstrated the contributions made in listening comprehension research.

The need for further research was demonstrated by the fact that only within the last decade has the sampling technique of speech compression been perfected. The sampling method has been proven superior to other methods of compression from the standpoint of intelligibility and compression (Duker, 1974). The highly sophisticated compressed speech tape recorder has been available commercially for only seven years. The majority of compressed speech research was undertaken prior to the marketing of this equipment. (The tape recorder utilized in this study, the Lexicon Varispeech II, compresses speech electronically by means of the sampling method.)

The majority of studies reviewed have utilized rather short listening sessions based on listening or reading comprehension tests. The results of these studies were not generalizable to the listening requirements placed upon college students. No studies reviewed prior to 1970 utilized college students who were exposed to compressed speech

listening sessions greater than thirty minutes (Adelson, 1972). Only three research studies were reviewed which utilized treatments in excess of thirty minutes in length (Eckhardt, 1970, Adelson, 1972 and Godwin, 1973). Two of these studies used multi-media presentations as treatment material (Eckhardt, 1970 and Godwin, 1973). Lorge (1959), Parker (1970), and Adelson (1972) among others, called for further research incorporating treatment material length in excess of twenty minutes. Adelson confirmed in a personal conversation that to her knowledge no further followup to her research incorporating an extended treatment had been undertaken.

Few studies involving compressed speech have incorporated delayed post tests to measure retention by subjects. Prior to 1970 only two such studies were noted (Foulke & Sticht, 1966 and Friedman, et al., 1966(a). Neither Foulke and Sticht (1969) nor Duker (1974) devoted attention to delayed post testing as a section in their comprehensive reviews of the literature. Studies by Foulke and Sticht (1966), Friedman, et al., 1966(a). and George (1970) measured delayed recall. However, each of these authors utilized rather short passages as treatment material. Authors appeared to be in general disagreement in regard to the effect of compressed speech listening upon delayed recall of factual information (George, 1970 and Adelson, 1972). This substantiates the need for further research to determine the ability of college students to retain factual information based on longer presentations.

While compressed speech studies have been conducted involving students of various ability and reading levels, little research has been

conducted regarding the adult remedial student (Robertson, 1977). Many studies reviewed by Foulke and Sticht (1969) and Duker (1974) utilized elementary and junior high school students. Research findings for these populations cannot be generalized to the community college student. The research of Sticht and Glasnap (1971) indicated that further study is necessary to determine the capability of subjects of various abilities to comprehend compressed speech.

The review of the literature regarding the characteristics of the community college developmental and non-developmental student indicated their differences in learner characteristics. The review of the literature concerning the developmental student appeared to be contradictory in regard to the reasons for that group's poorer academic performance when compared to the non-developmental student (Roueche and Kirk, 1973; Abell, 1970; and Jeter, 1975). Inclusion of the developmental and non-developmental student classification as an independent variable in the study provided further information about the ability of each to benefit from compressed speech instruction.

In conclusion, the review of the literature in compressed speech called for further research in the length of treatment sessions, the measurement of delayed recall through the use of delayed post-tests, and the comparison of students of varying abilities to comprehend compressed speech. The review of the literature regarding the characteristics of the developmental community college student called for further experimentation regarding procedures for providing new instructional

methods for these students (Campbell, 1976 and Hardison, 1977). It is for these cumulative reasons that the study incorporated the following variables: (1) type of student (developmental and non-developmental); (2) type of treatment (0% compression, 33% compression, and 57% compression); and (3) time of testing (immediate and delayed) in the experimental design.

Chapter 3

RESEARCH METHODOLOGY

This chapter will describe the following aspects of the study: (1) the population, (2) sampling procedures, (3) development of the treatment material, (4) preparation of the treatment, (5) development of the instrument, (6) the pilot studies, (7) procedures of the experiment, and (8) the data treatment. The null hypotheses for the study are stated in this chapter.

Population

The population was composed of community college students drawn from classes in developmental English and non-developmental English and Speech who spoke English as a first language at an urban community college, Northern Virginia Community College. The two types of students who participated in the study, developmental and non-developmental, were selected because of their different learner characteristics, as discussed in Chapter 2. Developmental students comprise a significant portion of the total enrollment in the Virginia Community College System. Approximately 12% of the student enrollment in the Virginia Community College System in Fall 1975 was developmental (Hardison, 1977). Developmental and non-developmental students are not equivalent populations.

Sampling Procedures

The purposes and procedures of the study were outlined in an abstract which was provided to English and Speech faculty of the

Northern Virginia Community College. Further details regarding the procedures were given to faculty who desired to have their classes participate in the study. Students were drawn from 14 intact developmental English classes at the Northern Virginia Community College Alexandria Campus. Students were also drawn from 4 intact college level English and 4 intact Speech classes at the Northern Virginia Community College Alexandria Campus. All students who met the guidelines for participation in the study were allowed to participate. Students were required to speak English as a first language and have no known hearing loss. Additionally all subjects had no previous exposure to compressed speech instruction. One hundred developmental and 87 non-developmental subjects met the established guidelines. All students participated in the study as part of a normally assigned laboratory activity. A table of random numbers was used to assign subjects to three experimental treatment groups for both developmental and non-developmental groups.

All participants who were classified as developmental for the purpose of the study had been placed in developmental reading courses as the result of the administration of two standardized reading tests. The details of this placement procedure are presented in Appendix B.

Development of the Treatment Material

The treatment material used in the experiment was developed from Wallace Notestein's (1954) text: History of the English People on the

Eve of Colonization 1603-1630. The recorded presentation dealt with the practices, beliefs, and diversions of two classes of individuals living in England during the seventeenth century. The treatment questions were originally developed by Herbert L. Friedman and David B. Orr, and were used for listening comprehension research in the 1960's. A portion of this treatment material was used by Adelson (1972) in her compressed speech research. Harper and Row, publishers of the material, granted permission for use of the original material. (See Appendix C). Permission to use the questions developed from the textual presentation was granted by David B. Orr (1979).

The treatment material was selected based upon its uninterrupted non-literary content, appropriate length, and prior use in listening comprehension research. English faculty members at the Northern Virginia Community College read the material and determined that the content was appropriate for use by developmental and non-developmental community college students.

Participating developmental English faculty members felt that the treatment material as presented in its original form required revision before use as treatment material. The following corrections were requested: (1) clarification of unfamiliar terms; (2) inclusion of transition sentences between new ideas; (3) clarification of sentence subjects where inaccurate modifiers were used; and (4) division of sentences of extended length into separate shorter sentences. As a result, the material was rewritten and evaluated prior to the two pilot

studies. After revisions were completed, the subject content specialists agreed that the treatment material was acceptable as presented.

The presentation was approximately forth-two minutes in length when read at an average rate of 175 words per minute. Additional information regarding the treatment material is found in Appendix D.

Preparation of the Treatment

The treatment material, and the instructions for subjects participating in the study were narrated by a professional female narrator and recorded on professional quality reel audio tape. The master recording was prepared by the Perceptual Alternatives Laboratory at the University of Louisville.

Copies of the treatment material were compressed to the 275 wpm (33% compression) and 400 wpm (57% compression) rate specified in the study within 1% accuracy using the Lexicon Varispeech II audio cassette tape recorder. Multiple copies of these treatment tapes were produced by real time reproduction techniques. A description of the sampling technique used by the Varispeech II for tape expansion and compression follows.

The Varispeech II is a conventional cassette tape recorder which incorporates a pitch computer. The tape recorder receives the playback signal and samples it with an input sample and a hold circuit. The input sampling rate varies from 8,000 to 32,000 times per second, and is proportional to the tape speed. The samples are digitized and stored temporarily in a computer memory by circuits

that write new samples in over the old. The 512 most recent samples are always in the memory. Other circuits are continually reading samples out of the same memory, but at a fixed rate of 16,000 samples per second. This procedure accomplishes pitch correction. The sampling rate corresponds to normal speed and pitch.

The following example illustrates how this procedure works when playing back a tape at twice normal speed (50% compression). For every 512 samples read into the memory, 256 are read out. The 256 sample segment, equivalent to sixteen thousandths of a second, is discarded in order to read out the remaining 256 samples at the slower correct rate. The output samples are a stream of short time fragments stretched back out in time to fill in the missing spaces left by the deleted fragments. The read circuit examines these samples in the memory to determine the best time to make quiet splices in order that the rejoined fragments blend together without pops and clicks (Varispeech II, 1976).

The intelligibility of all tapes which were compressed was determined to be of acceptable quality by the subject content specialists and by individuals who participated in the first pilot study held at the Northern Virginia Community College Alexandria Campus.

Development of the Instrument

The multiple choice post test was composed of both factual and inferential questions taken from the treatment material. Duker (1974) indicated that past research demonstrates the reliability of the multiple choice test when compared to other test forms when used to assess

compressed speech comprehension. The reading level of the questions used on the post test was determined to be 8th grade using the Fry (1978) reading level scale. The questions as presented on the post test were deemed satisfactory by the developmental faculty participating in the study after minor modifications were made to some questions. These modifications were in the form of clarification or simplification of some words. All fifty-five items used in the original post test were included in the pilot study. This test was used by Orr (1965) and Adelson (1972) in their research. The post test is included as Appendix E.

The Pilot Studies

The proposed experimental procedures for the study were evaluated through the use of two pilot studies undertaken at the Northern Virginia Community College during Fall quarter 1979. In the first pilot, a total of twelve students, six control and six experimental, provided feedback. The control students did not hear the presentation and only answered the questions on the treatment post test. The control group in the pilot study and a control group in the experiment were incorporated to determine that the subjects' scores were a function of the information heard on the experimental treatment. Students assigned to the experimental group heard the presentation at 0% compression, and answered the questions on the treatment post test. The students participating in the first pilot provided feedback regarding the content of the study. Students participating in the first pilot were currently enrolled in developmental English courses.

Three classes of developmental English students who met the guidelines for participating in the study took part in a second pilot and were tested on the treatment material. Students who participated were assigned by their instructor. The same conditions as in the first pilot were employed with the exception that the tapes were professionally recorded. The Kuder-Richardson (KR-20) Test of Reliability was used to evaluate the treatment tests completed by subjects hearing the treatment material in both pilots. The KR-20 was determined to be .83. The subjects who had participated in the second pilot were asked to provide evaluatory comments regarding the study methodology and the content presented in the pilot study. Developmental reading faculty provided additional feedback at this time. The forms used to collect student information in the second pilot are included as Appendix F.

The results of the pilots were used to make appropriate modifications to the design and methodology of the study. It was decided not to time the students in answering the questions on the treatment post test questions. It was deemed of greater importance that subjects complete the test answering all questions rather than be required to meet a specific time deadline. Questions on the treatment material post test which had a discrimination index of less than .15 and a difficulty index of greater than .90 were omitted in order to increase test reliability. The test developed from the treatment material was reduced to thirty-nine items. The discrimination and difficulty

indices for items on the first and second sections of the presentation were assessed, and an equal number of items from each section was left intact. The first section of the presentation, "The Yeoman", contained 21 questions. The second section of the presentation, "The Country Gentleman", contained 18 questions.

Procedures of the Experiment

During the Winter quarter of the 1979-1980 academic year, the rationale, objectives, and operational procedures for the study were discussed with the participating faculty members at the Northern Virginia Community College. All prospective participating faculty were provided with a personal copy of a detailed abstract of the study.

Subjects who participated in the experiment had not taken part in either pilot study. Eligible students in each participating class were randomized into one of three specific groups by use of a table of random numbers. The students' corresponding numbers on rosters of developmental and non-developmental students determined their group assignment. The three experimental groups heard the treatment material entitled "The Yeoman and Gentleman in English History" and answered the appropriate questions on each. Subjects participating in the experimental groups received instruction either at 0% compression (175 words per minute), 33% compression (275 words per minute), or 57% compression (400 words per minute) on the basis of the random assignment process. The rates of 275 and 400 words per minute were selected because of the results of previous studies

as discussed in Chapter 2, The Review of the Literature. Foulke and Sticht (1969) and Duker (1974) indicated that 275 words per minute appeared to be an optimal level for compressed speech instruction. The 400 word per minute rate was used as an additional experimental measure as this rate had been previously used as an upper limit in prior compressed speech research (Duker, 1974).

The experimental treatment was administered in the audio laboratory of the Learning Laboratory of the Northern Virginia Community College Alexandria Campus. The laboratory staff kept a list of participating students on a roster for each of the experimental groups. Only students whose names appeared on the roster were permitted to participate in the study. Students were provided with sealed packets which contained questions and opscan answer sheets for the treatment.

All students who participated in the experimental groups received their treatment individually in listening carrel by headphone. Carroll and Cramer (1968) determined that students participating in an experimental study who listened through headphones recalled 22% more material than an equivalent group of students who did not listen through headphones.

Students participating in the experimental groups were then informed that they were taking part in an experimental study to measure listening comprehension. The subjects were informed that they should devote full attention to the taped presentations due to the fact that they would be asked to recall information on a test at

the end of the tape. All subjects were additionally informed that the scores from the test would not be recorded for grading purposes in the course for which they were enrolled. This decision was made in order that student participation not have a possible punitive effect on their course grade. A second rationale for this approach was that few published studies have focused on the relationship of motivational factors and recall of compressed speech information (Beatty, Behnke, & Froelich, 1980). Instructions provided to students in the experimental groups are included as Appendix G.

It was decided that the subjects would not be permitted to take notes on the presentations due to the results of prior research in regard to note taking practices and listening comprehension during expository lectures. Peters (1972) found concurrent note taking and listening inferior to a no-notes control group. McClendon (1958) found that listening comprehension was as effective when subjects were restricted from taking any notes, as when various forms of note taking were employed. McClendon (1958) drew his conclusions on both immediate and delayed recall conditions. As the experimental treatment conditions called for immediate recall of presentation material immediately following its conclusion, it was felt that note taking would be deleterious to recall.

All subjects who participated in the experimental treatments were supervised. This procedure insured student adherence to the conditions of the experiment.

The students assigned to the experimental group which heard the treatment presentation at 0% compression heard the material entitled "The Yeoman and Gentleman in English History," and then responded to thirty-nine questions regarding the presentation. The students were then thanked for their participation in the study.

Students assigned to the experimental groups which heard the treatment material at the 33% and 57% compression rates followed the same experimental procedures as the 0% compression group with the following exceptions. A short message introducing the treatment material provided a brief description of compressed speech and its uses in education. Prior research indicated that no one method is better than another in introducing compressed speech to subjects who participate in a single treatment experimental design (Duker, 1974, and Langhoff, 1973). Therefore, the first two and one half minutes of the treatment material "The Yeoman and Gentleman in English History" was presented in gradually compressed form for each of the 33% and 57% compression groups until the tape reached the appropriate compression level.

In support of this introductory method to compressed speech treatment Duker (1974) stated that the incremental exposure to compressed speech by slowly increasing the word rate may have some benefit on comprehension of compressed speech. Klavon (1975) incorporated this technique in an attempt to "provide a controlled transition period for the listener" (p. 48). This approach is discussed in Chapter 2. Students participating in the 33% and 57% compression groups were informed that no questions from this introductory period would be included on

the treatment post test. With the exception of the two aforementioned modifications, subjects of each experimental group had the same experimental conditions. At the conclusion of the study these groups were also thanked for their participation.

A delayed post test was administered to the experimental groups fourteen days after the treatment, and included as a dependent variable in the study. Students were not informed that they would be given the delayed post test. The delayed post test was included to measure any decrement of listening comprehension over time. Nichols (1957) documented that students forget learned material over time. Nichols (1957) discovered that only 25% of information presented orally was retained by subjects beyond a one week period subsequent to treatment. Koppenaal (1963) and Slamecka (1966) reported a half-life period (e.g. the length of time for retention to decrease by 50%) of approximately twelve days for learned material.

The items and sequence of questions on the delayed post test were identical to that of the immediate post test. The delayed post test was administered in the subject's regularly scheduled class by the faculty member. In the circumstance that the subject missed that class, the scores for these participants were not included in the data analysis of the post test and delayed post test scores. The other subjects who did not complete the post test or delayed post test were also omitted from the study. Information regarding the attrition rate of subjects who participated in the study is found in Appendix H.

Data Treatment

The answers to the post test and delayed post tests were recorded on optical scan forms utilized and scored by the Learning Resource Center Testing Services at Virginia Tech. The resulting data were analyzed by computer using SPSS and SAS computer programs.

A three-way analysis of variance with repeated measures was calculated using the Lindquist Type III ANOVA (Huck, Cormier, & Bounds, 1974). This design was used since three factors were involved in the study (treatment type, student classification, and time of testing). Repeated measures were made on the third factor, time of testing. In this case the experiment was designed in order that the main effects of treatment type and student type and their interaction were between-subjects effects. The main effect which involved a repeated measure, time of testing, and all interactions involving this factor were within-subjects effects.

The analysis procedure for the Lindquist Type III ANOVA required equal cell sizes (see Appendix H). The smallest intact group to complete the study contained twenty subjects. Therefore, the other remaining groups were reduced to that size. This process was accomplished by randomly selecting twenty student numbers from each of the other five groups. One hundred and twenty subjects' scores on the post test and delayed post test were used for the analysis.

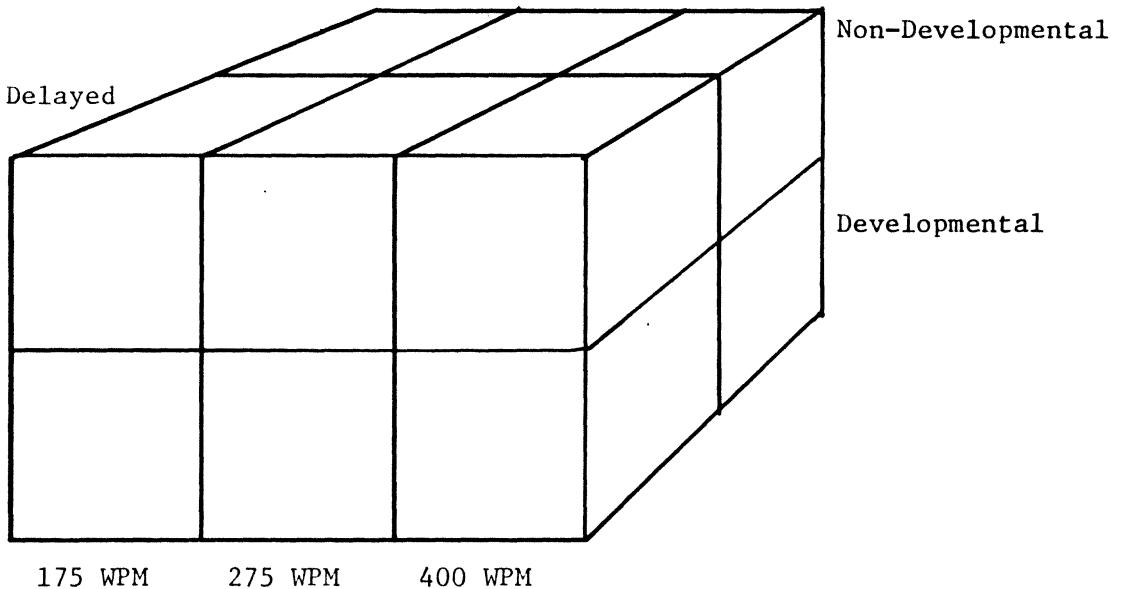
A 3X2X2 factorial configuration was used, and is illustrated in Figure 1. The independent variables for this portion of the

Time of Test

Type of Student

Immediate

Delayed



Method of Instruction

Figure 1. Illustration of the 3X2X2 Factorial Design for the Three-Way ANOVA with Repeated Measures for Post Test and Delayed Post Test Scores.

study were the methods of treatment (175, 275, and 400 words per minute presentation), classification of subject (developmental or non-developmental), and the time of testing (immediate post test and delayed post test). The dependent variables were the achievement scores on the post test and the delayed post test.

The research questions were tested by the following null hypotheses which were tested at the .05 level of significance:

- (1) There is no significant difference among the mean scores of the experimental groups receiving treatment at 0% compression, 33% compression, and 57% compression.
- (2) There is no significant difference between the mean scores of the developmental and non-developmental students assigned to the treatment groups.
- (3) There is no significant difference between the mean post test and delayed post test scores.
- (4) There is no significant interaction between type of treatment and type of student.
- (5) There is no significant interaction between the type of treatment and the time of testing.
- (6) There is no significant interaction between the type of student and the time of testing.
- (7) There is no significant interaction among the variables: type of treatment, type of student, and time of testing.

Chapter 3 has included a discussion of the research methodology incorporated in the study, the development of the instrument used to

measure listening comprehension, evaluation of the instrument in two pilot studies, procedures of the experiment, and the data treatment. The null hypotheses were stated in this chapter.

In Chapter 4, the results from the study will be presented. An analysis of the data, and the testing of the null hypotheses will be conducted.

Chapter 4

ANALYSIS OF THE DATA

Data resulting from the experiment which was composed of post test and delayed post test scores in the 3X2X2 design were analyzed by two computer programs, MANOVA by SPSS, and means and Duncan's New Multiple Range Test by SAS. Each of the null hypotheses for the data analysis will be discussed.

Demographic information for the students who participated in the data analysis is reported by type of student, developmental and non-developmental. The demographic information acquired from the students was age, sex, and race classification. This information was collected in order to determine whether developmental and non-developmental students differed in these aspects, and whether the demographic characteristics of these samples of students were reflective of their respective student populations.

The demographic information for developmental students who participated in the study is displayed in Appendix I. The demographic information for non-developmental students who participated in the study is displayed in Appendix J.

The information obtained from developmental and non-developmental students reveals differences between these student types. Developmental

students who participated in the study were more likely to be younger (17-21) than non-developmental students (over 30). The majority of developmental students were black, while the majority of non-developmental students were white. The majority of both student classifications were female.

In comparing the demographic information obtained from developmental students who participated in the study with that of the population of developmental students enrolled at the Alexandria Campus of the Northern Virginia Community College for the period Summer 1980-Winter 1981, two specific differences were noted. The typical student in the population was male in the 17-21 age range, and the majority of developmental students were of oriental descent. This discrepancy between the sample participating in the study and the population is accounted for as oriental students. These students, specifically Vietnamese, who were enrolled in developmental English as a second language, were eliminated from the study as English was not their first language.

In comparing the demographic information for non-developmental students who participated in the study with that of the larger population of non-developmental students for the three specified quarters, the typical student in the population was also female and white. However, the age of the non-developmental students in the population was younger, being in the 17-21 age range.

Analysis of the Hypotheses

Hypothesis 1. There is no significant difference among the mean scores of the experimental groups receiving treatment at 0% compression, 33% compression, and 57% compression.

As indicated in Table 1, there were significant differences between the three experimental groups, $F(2,239) = 4.86$, $p = <.01$. Therefore, Hypothesis One was rejected.

The mean score for the 0% compression groups was 48.80 with a standard deviation of 17.27. The mean score for the 33% compression groups was 46.63 with a standard deviation of 14.34. The mean score for the 57% compression groups was 40.21 with a standard deviation of 14.06. All scores are expressed as percentages.

Duncan's New Multiple Range Test was used to determine which means were significantly different from each other since a significant F ratio had been obtained in the variable, type of treatment. The results of this analysis conducted at the .05 level of significance indicated that the scores of the 0% and 33% compression groups differed significantly from the scores of the 57% compression group. There was no significant difference between the scores of the 0% and 33% compression groups.

Hypothesis 2. There is no significant difference between the mean scores of the developmental and non-developmental students assigned to the treatment groups.

Table 1
Summary Table of the Lindquist Type III ANOVA
with repeated measures

Source	df	SS	MS	F
Between Subjects				
Treatment	2	3192.05	1596.02	4.86*
Student	1	12098.40	12098.40	36.91**
Treatment X Student	2	791.87	395.93	1.20
Error Between	114	37363.40	327.74	
Within Subjects				
Time	1	2196.15	2196.15	89.44**
Treatment X Time	2	85.72	42.86	1.74
Student X Time	1	2.81	2.81	.11
Treatment X Student X Time	2	139.10	69.55	2.83
Error Within	114	2799.20	24.55	
Total	239	58688.70		

* p .01

** p .0001

As indicated in Table 1, differences in student type were significant, $F(1,239) = 36.91$, $p = < .0001$. Therefore, Hypothesis Two was rejected as non-developmental subjects scored significantly higher than developmental subjects. The mean score for developmental students was 38.11 with a standard deviation of 13.23. The mean score for non-developmental students was 52.31 with a standard deviation of 14.70.

Hypothesis 3. There is no significant difference between the mean post test and delayed post test scores.

As indicated in Table 1, differences in the time of testing were associated with differences in the scores on the post test and delayed post test, $F(1,239) = 89.44$, $p = < .0001$. Therefore, Hypothesis Three was rejected as the post test scores were significantly higher than the delayed post test scores. The mean post test score was 48.24 with a standard deviation of 15.23. The mean delayed post test score was 42.19 with a standard deviation of 15.57.

Hypothesis 4. There is no significant interaction between the type of treatment and the type of student.

As indicated in Table 1, there was no significant interaction between the type of student and type of treatment, $F(2,239) = 1.20$, $p = > .05$. Hypothesis Four, therefore was not rejected. The mean scores and standard deviations on the post test and delayed post test are displayed in Table 2.

Hypothesis 5. There is no significant interaction between the type of treatment and the time of testing.

Table 2

Mean Scores and Standard Deviations
on the Post Test and Delayed Post Test

Type of Student	Time of Testing				
	Group ^a	Post Test		Delayed Post Test	
		$\bar{x}$	SD	$\bar{x}$	SD
Developmental	0%	42.00	14.65	39.15	13.53
	33%	46.85	13.13	37.35	13.68
	57%	34.90	9.25	28.45	6.80
Non-Developmental					
	0%	60.15	15.51	53.90	17.10
	33%	53.90	13.42	48.45	12.90
	57%	51.65	11.58	45.85	14.49

Note. All scores are expressed as percentages.

^a_n = 20 in each group.

As indicated in Table 1, there was no significant interaction between the type of treatment and time of testing, $F(2,239) = 1.74$, $p = > .05$. Hypothesis Five, therefore, was not rejected.

Hypothesis 6. There is no significant interaction between the type of student and time of testing.

As indicated in Table 1, there was no significant interaction between the type of student and time of testing, $F(1,239) = .114$, $p = > .05$. Hypothesis Six, therefore, was not rejected.

Hypothesis 7. There is no significant interaction among the variables: type of student, type of treatment, and time of testing.

As indicated in Table 1, there was no significant interaction among the variables, type of student, type of treatment, and time of testing, $F(2,239) = 2.83$, $p = > .05$. Hypothesis Seven, therefore, was not rejected.

Summary

The three way analysis of variance for the 3X2X2 design indicated that significant differences were noted in the main effects (type of treatment, type of student, and time of testing). No interaction of these variables was statistically significant.

Chapter 5 will present the summary, discussion, and recommendations for further study.

Chapter 5

SUMMARY, DISCUSSION, AND RECOMMENDATIONS FOR FURTHER STUDY

Reviews of listening comprehension research within recent years have stated the need for further research employing the technique known as compressed speech. The literature specifically called for further research regarding extended treatment length, the measurement of delayed recall, and the comparison of subjects of varying abilities in the comprehension of compressed speech. It is for these reasons that the study incorporated community college students classified as developmental and non-developmental subjects, various rates of speech compression, and immediate and delayed post test on the treatment material. The treatment material developed for the purpose of experimentation was 42 minutes in length and was an expository lecture on two classes of individuals living in 17th century England. The results of the study have added to the body of knowledge within the field in listening comprehension research, specifically, that which deals with compressed speech.

Summary

The purpose of this study was to determine the degree to which developmental and non-developmental community college students could retain information presented in an uninterrupted 42 minute presentation

which was compressed to various rates. The ability of the subjects to recall information over time was also measured. The purpose of the study was to answer the questions:

1. Will there be any difference in comprehension of an extended audio presentation in various compressed or uncompressed versions?
2. Will there be any difference in comprehension between community college students classified as developmental or non-developmental?
3. Will there be any difference in recall of information by treatment type and student type over time?

An experiment was conducted at the Northern Virginia Community College to answer these questions. Permission was obtained from all appropriate individuals prior to the beginning of the experimental study. One hundred thirty-one developmental English and non-developmental English and speech students participated in the study (see Appendix H). These classifications of students were randomized into one of three groups. Three experimental groups heard the treatment material presented at a designated rate of compression, and took a post test based on this material. The subjects in the treatment groups also took a test measuring their recall of the treatment material on the 14th day following their treatment.

Data resulting from the study were analyzed using SPSS and SAS programs. The analysis was a 3X2X2 Lindquist Type III ANOVA with repeated measures. The following results were obtained upon the completion of the statistical analysis of the data.

The analysis of variance with repeated measures indicated a

significant difference as to type of treatment. There was no significant difference between the scores of the 0% and 33% compression groups. There was a significant difference between the scores of the 0% and 33% compression groups, and the 57% compression group.

The analysis of variance indicated a significant difference as to classification of student. Non-developmental students scored significantly higher than developmental students.

The analysis of variance revealed a significant difference in the time of testing. Student scores were significantly higher on the post test than on the delayed post test.

There was no significant interaction between any of the variables: type of student, type of treatment, and time of testing.

Discussion

An overview of the results of the study suggests that the use of speech compression does not increase the listening comprehension of subjects who listen to an extended presentation. However, the Duncan's New Multiple Range Test indicated no significant difference between the scores of the 0% and 33% compression groups.

The expected result of the study was the statistical difference in the test scores of community college students classified as developmental and non-developmental. The non-developmental students scored higher on every corresponding measurement than did the developmental students. The non-developmental students scored seven to eighteen points higher than the developmental subjects on their comparable treatment type and time of testing. The degree of difference in test scores for these two types of students would indicate the heterogeneity of these two student populations within the community

college. This occurrence suggests that placement procedures for students enrolling in English at the community college are valid.

Previous studies (Fairbanks, et al. 1957; Diehl, et al. 1959; Foulke, 1962; and Foulke and Sticht, 1967) have indicated that comprehension of compressed speech was unaffected by word rates to approximately 275 words per minute. Carver (1973) indicated that there was a moderate linear decline in listening comprehension beyond the normal speech rate. The results of this study would tend to agree with results of many previous researchers since the listening comprehension skills of subjects hearing the 33% compression (275 words per minute) presentation was only two points less than for the subject hearing the presentation at 0% compression (175 words per minute). It is imperative to note that the conclusions of these previous researchers were drawn based on treatment conditions where the presentation content was less than twenty minutes in length. The results of the study do not agree with previous researchers whose findings indicated that comprehension of presentations approached a level of chance probability, or 25%, as the rate of compression is increased (Fairbanks et al. 1957). The results of the study do appear to be in agreement with Carver (1973) who reported a moderate linear decline in listening comprehension for presentations beyond the normal rate. This same moderate linear decline appears in the results of the study as illustrated in Appendix K.

This study revealed that there was a significant decline in test scores for all treatment types and both classifications of students between the post test and delayed post test. The results of

the study would tend to support research findings by Foulke and Sticht (1966), George (1970), and Cicardo (1974) which indicated that retention of the treatment material lessens with the passage of time. However, the decline in listening comprehension for the presentations did not approach the half-life figure as reported by Koppenaal (1963) and Slamecka (1966).

All students, regardless of classification, scored significantly lower on the delayed post test. It is significant to note that the decline in the mean test scores by treatment type was only approximately six points for both classifications of students. As students were not informed that they would be retested on the treatment material, and were not provided with specific incentive for recalling the information presented in the treatments, one can only hypothesize why the decline in the delayed post test scores was minimal. Perhaps students merely recalled answers chosen on the post test, and utilized these answers again. Students were not provided with the correct answers following the post test.

The obviously lower post test and delayed post test scores by developmental subjects appear to substantiate the findings of Roueche and Kirk (1973) regarding the general lower achievement level demonstrated by these subjects. Results from the study support the conclusions drawn by previous researchers regarding the correlation of reading ability and listening comprehension skills (Ross, 1964; and Brown, 1965). The overall lower post test and delayed post test scores for lower aptitude subjects, in this circumstance, develop-

mental community college students, replicates the findings of Orr, Friedman, and Williams (1965), Breed (1977), and Robertson (1977).

It is possible that the significant difference between the test scores of the developmental and non-developmental students may be due in part to the greater reading proficiency of the non-developmental students. The differences in scores by these student types may have been lessened if the participants had been presented the post test and delayed post test questions orally. This particular approach to the administration of the test was decided against given the time requirement for participation in the study.

Another factor which might have contributed to the higher scores of the non-developmental students is their general academic superiority. Perhaps non-developmental students have developed an acuity for test taking as they are better able to eliminate obviously incorrect multiple choice answer selections. Another factor contributing to the superior scores of the non-developmental students might be their greater sense of self confidence in testing circumstances.

The results of the study tend to support the earlier findings of Adelson (1972) regarding the use of extended presentations for compressed speech treatment material. Adelson determined that the use of moderate degree of speech compression (275 wpm) did not increase the listening comprehension of subjects hearing the presentation. The treatment material used in this study was adapted from material that was used in Adleson's research.

Both developmental and non-developmental students provided feedback regarding their participation in the study. Unsolicited comments were provided by students upon their completion of the treatment when the post tests were handed in as students individually left the treatment area. One instructor whose students participated in the study videotaped a discussion of their reaction to the treatments. In both circumstances students provided very candid observations about their reactions to their respective treatments. Students regardless of classification, reported that the 33% compression of the treatment required their full concentration in order to comprehend the information presented. Students hearing this treatment type indicated that they had no time for paying attention to their environment or for daydreaming. Students, regardless of classification, reported that the 57% compression of the treatment required too much concentration in order to comprehend the information presented. Some of these students reported that after a few minutes of exposure the message became a buzz. They also felt that they had learned very little from this presentation rate. Obviously, student motivation was lowered, particularly at the highest compression level.

Future research which measures listening comprehension of subjects exposed to extended treatments should consider the issue of subject motivation as informal feedback from a sample of participants in the study indicated that some individuals experienced boredom and mental fatigue. Beatty, Behnke, and Froelich (1980) have criticized

previous listening comprehension research on the basis that the relationship between motivational factors and recall have not been sufficiently explored.

The incidence of boredom and mental fatigue was reported by both student classifications and all treatment types. The subjects who heard the 0% compression of the treatment indicated that the presentation was too lengthy, and that their interest was lessened. Many subjects reported that they daydreamed during the presentation. Some subjects who heard the presentation at the 33% compression indicated that the requirement for full concentration was stressful. Some subjects who heard the presentation at the 57% compression rate indicated that their concentration on the message was minimal since they could not keep pace with the high rate of compression. A smaller number of students who participated in the 33% and 57% compression groups indicated that their participation had created headaches, backaches, and other physiological manifestations of stress.

The incorporation of procedures to measure physiological and psychological stress by subjects who participate in compressed speech instruction may serve to provide additional information for future researchers who undertake research. The Spielberger (1966) STAI-A State Anxiety Inventory is one such instrument which might be used effectively in research to measure the degree of anxiety experienced by participants. In this manner, the motivation state of subjects participating in future studies may be monitored. The use of anxiety

measurement might serve to enhance the validity of future compressed speech research given the fact that subjects participating in this and other previous studies have reported anxiety and boredom as a result of their participation.

The data analysis of treatment type indicated that subjects participating in this study had the highest score on the 0% compression of the treatment material. However, the lack of a significant difference between the mean scores of the 0% and 33% treatment groups may support the use of presentations which are moderately compressed at the 33% (275 wpm) level.

Recommendations for Further Study

Recommendations for further research are based on the data analysis, discussion of the study, informal feedback provided by subjects and faculty participating in the study, and conditions unique to the administration of the study.

Conditions which were unique to the administration of this study included its administration at an urban community college in Northern Virginia which serves a diverse ethnic population. Additionally, subjects who participated heard only one type of treatment material, a lecture dealing with 17th century England. Furthermore, no consideration was given to the measurement of student attitudes toward the treatment procedures, content, or to the compressed speech presentation.

Therefore, the following recommendations for further study are as follows:

1. It may be desirable to replicate this study at different community college settings to validate the results of the study.
2. Further compressed speech research utilizing extended presentations might incorporate technical or scientific information.
3. Future research regarding the viability of compressed speech presentations might incorporate physiological and psychological measurement of participants' stress factors.
4. The relatively small decline in listening comprehension two weeks after the treatment would suggest that further research in listening comprehension should continue to incorporate delayed post tests in an effort to determine the long range effects of specific treatment types.
5. Faculty and students who were involved in the study felt that compressed speech might prove beneficial as a review technique. Future studies could compare comprehension demonstrated by subjects hearing an extended lecture presented orally with a group hearing the same lecture, and then hearing the taped lecture at various rates of compression.
6. Some students who participated in the experimental groups which heard the compressed versions of the treatment material expressed concern that they could not control the rate of presentation. Further research needs to incorporate student determination of the compressed speech rate at which treatment is heard. Such a study would have to

incorporate training sessions of equivalent length prior to the student's participation in the study.

Specific features were incorporated into the study in order to provide a more realistic application of compressed speech research in a community college setting. The unique features of the study include the use of an extended presentation 42 minutes in length, a delayed post test administered two weeks after treatment, and classification of subjects based on reading ability.

With a few exceptions, previous compressed speech research had utilized much shorter passages, many of which were taken from standardized reading tests or well known literary selections. Few studies had incorporated an instrument to measure delayed recall of information presented. Furthermore, no known studies had incorporated community college students classified according to their performance on a standardized reading test.

Given the results of the study, and its contributions to compressed speech research, it is recommended that future studies continue to use extended uninterrupted presentations while measuring delayed recall of material presented. In circumstances where subjects vary in regard to reading ability they should be classified accordingly. Through the application of these procedures compressed speech research can duplicate more realistically the instructional requirements placed upon students attending institutions of higher learning.

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APPENDIX A

GLOSSARY

APPENDIX A: GLOSSARY

Compressed speech is used to denote oral tape recorded messages in which brief segments of the message have been deleted electronically without significant distortion in vocal pitch or quality, resulting in a reduction of time required for the presentation of aural messages by increasing the number of words delivered per minute (Parker, 1970).

Developmental college students are individuals who speak English as a first language and are enrolled in Northern Virginia Community College English courses numbered 01-14. Students are placed in these classes after an analysis of high school transcripts, SAT, standardized placement tests, and other data regarding the student's level of achievement. Developmental English students have an average reading level of eighth grade.

Non-developmental college students are individuals who speak English as a first language and are not enrolled in Northern Virginia Community College developmental English courses, and who have no restrictions upon enrollment in college level courses.

Listening is the act of giving attention to oral language not merely in hearing the symbols, but in receiving ideas with understanding. In this study the activity of listening is that which is measured by the post test and delayed post test on the treatment material.

0% compression is oral information which is presented at the normal rate of the speaker, approximately 175 words per minute.

33% compression is oral information which has been compressed to 66% of its original real time playback, approximately 275 words per minute.

57% compression is oral information which has been compressed to 43% of its original real time playback, approximately 400 words per minute.

APPENDIX B

DEVELOPMENTAL STUDENT PLACEMENT PROCEDURES

APPENDIX B: DEVELOPMENTAL STUDENT PLACEMENT PROCEDURES

All participants who were classified as developmental for the purpose of the study were placed in the developmental reading courses as a result of the administration of two standardized reading tests. The Stanford TASK Test of Academic Skills was used to evaluate all registrants for college reading courses. The Stanford TASK Test for reading measures reading comprehension and vocabulary. The Kuder Richardson Formula 20 Test of reliability for the Level II Form A and B Reading test which was administered to prospective reading students is reported at .94 with a standard error of measurement of 2.5. Students who scored less than eighty per cent on this test were placed in the developmental reading, English 008 course.

A second assessment of reading comprehension was conducted by the reading faculty at their initial class meeting with the students. Students were administered the Diagnostic Reading Test as a check of the original placement procedure. The Diagnostic Reading Test, consists of a measurement of reading rate, story comprehension, vocabulary, and general comprehension. The KR-20 for each of the test sections is reported at .80, .89, .83, and .85 respectively. Students who scored more than 75% on this test may register in the college reading series, and are not registered as developmental students. All participants in the study met these conditions for placement, and were classified as developmental students.

APPENDIX C

LETTER OF PERMISSION FROM HARPER & ROW



Harper & Row, Publishers, Inc.

New York Hagerstown San Francisco London

10 East 53d Street, New York, New York 10022

November 1, 1979

Mr. David L. Williams
Audio Visual Services
Northern Virginia Community College
3001 North Beauregard Street
Alexandria, VA 22311

Dear Mr. Williams:

You may make the three audio tape copies of pages xi, 45-60, and 70-83 from THE ENGLISH PEOPLE ON THE EVE OF COLONIZATION, 1603-1630 by Wallace Notestein for use in the manner specified in your letter of October 16, 1979 provided that on each tape you include an acknowledgement to our book, title, author, copyright notice and Harper & Row, Publishers, Inc. We understand that these three tapes will be used solely for research purposes at Northern Virginia Community College.

Thank you for contacting us.

Sincerely,

LSR/wc

Linda S. Rogers
Permissions Editor

APPENDIX D
INFORMATION REGARDING
THE TREATMENT MATERIAL

APPENDIX D: INFORMATION REGARDING THE TREATMENT MATERIAL

	"The Yeoman"	"The Gentleman"
Words Per Sentence Per 100 Words	13.7	13.8
No. of Sentences Per 100 Words	7.3	7.5
No. of One Syllable Words Per 100	68	57
No. of Syllables Per 100 Words	151	155
Ease of Reading (Flesch)	64	47
Reading Level (Fry)	8th grade	8th mid year

Note: Ease of reading and reading grade level determinations were made by randomly sampling the individual passages six times each.

APPENDIX E

THE TREATMENT MATERIAL

POST TEST/DELAYED POST TEST

APPENDIX E

THE TREATMENT MATERIAL POST TEST/DELAYED POST TEST

Directions: Enter your student ID number in the box on the answer sheet. Please answer questions 41-43 first. Mark the number corresponding to the answer you choose.

41. Specify your sex.

1. Female.
2. Male.

42. Specify your race.

1. Black.
2. Oriental.
3. White.
4. Other.

43. Specify your age category.

1. 17-21.
2. 22-25.
3. 26-30.
4. over 30.

Read each question carefully and choose the best answer. On the answer sheet provided, mark the number corresponding to the answer you choose. Use the pencil to completely blacken your answer. Answer all questions even if you are not entirely sure of the answer. When you have completed answering all questions, place the questions and the answer sheet in the envelope.

The Yeoman and Gentlemen in English History

1. The term extortioners was used to refer to:

1. Churchwardens.
2. stewards.
3. lawyers.
4. yeomen.
5. landlords.

2. The younger son of the yeoman could choose among several occupations, however, the more ambitious younger sons:
 1. became justices of the peace.
 2. became schoolmasters, doctors, or lawyers.
 3. became apprentices to London merchants.
 4. worked for their fathers as managers.
 5. worked for the lords of the manors.
3. Which of the following does the author describe as the "disease of the English gentleman"?
 1. Traveling.
 2. Drinking.
 3. Idleness.
 4. Stinginess.
 5. Socializing.
4. The wife of a yeoman had little conversational subjects with the exception of:
 1. feudal law.
 2. plays.
 3. chronicles.
 4. the Scriptures.
 5. poetry.
5. The daughter of the Yeoman was brought up to believe that the best background for marriage was:
 1. religion.
 2. education.
 3. social position.
 4. money.
 5. household skill.
6. What modern vegetable was not planted until nearly the end of the 17th century?
 1. cabbages.
 2. cucumbers.
 3. melons.
 4. radishes.
 5. potatoes.

7. In England the families who won political power had yeoman blood in their veins as shown by their:
 1. industry.
 2. simplicity.
 3. neighborliness.
 4. hard practicality.
 5. generosity.
8. The ideals and traits of the yeoman were also the ideals of the English who went to:
 1. Holland.
 2. Quebec.
 3. Virginia.
 4. New England.
 5. the Indies.
9. In theory a yeoman could not exercise a craft:
 1. under any circumstances.
 2. unless he had a license.
 3. unless it was a family enterprise.
 4. unless he gave up his land.
 5. unless it was needed in the community.
10. During the sixteenth and seventeenth centuries, disputes occurred between landlords and yeomen. The predominant cause of these disputes was:
 1. lower prices for farm produce.
 2. the militant attitude of landlords towards yeomen.
 3. redivision of the lands among the yeomen.
 4. the increases in rent charged for the land.
 5. personal conflicts arising from class struggles.
11. Yeomen were often slow in making payments that were due because:
 1. they were generally short of money.
 2. excessive payments were forced upon them.
 3. their creditors were very lax in their demands.
 4. the costs of educating children were so high.
 5. they were often tightfisted and thrifty.

12. The social status of the yeomen in relation to the country gentlemen was:
 1. far below.
 2. just below.
 3. about equal.
 4. just above.
 5. far above.
13. The month during which the sheep were washed and sheared was:
 1. April.
 2. May.
 3. June.
 4. July.
 5. August.
14. The small yeoman was also known as a(n):
 1. dirt farmer.
 2. country gentleman.
 3. husbandman.
 4. freeman.
 5. entrepreneur.
15. The intellectual life of the yeoman centered about:
 1. the church.
 2. the town hall.
 3. politics.
 4. literature.
 5. the arts.
16. The export of grain by yeomen was sometimes stopped by the:
 1. justice of the peace.
 2. lord of the manor.
 3. parson.
 4. constable.
 5. sheriff.
17. When did the yeoman kill cattle and salt meat?
 1. August.
 2. July.
 3. June.
 4. March.
 5. November.

18. The clothes of the wife of the yeoman could often be described as:

1. fashionable.
2. becoming.
3. plain.
4. threadbare.
5. inadequate.

19. The practice of enclosure is described as:

1. superior to unenclosure in every way.
2. superior to unenclosure in most ways.
3. superior to unenclosure only for the well-to-do yeoman.
4. superior to unenclosure only for the livestock.
5. superior to unenclosure only for the late crops.

20. In our own contemporary American society, the type of individual most closely resembling the yeoman is the:

1. white collar worker.
2. small town business man.
3. professional man.
4. small farm worker.
5. blue collar worker.

21. The yeoman was particularly busy:

1. when he plowed and cultivated the soil.
2. when he washed and sheared the sheep.
3. when he sowed wheat and rye.
4. when hay was cut and dried.
5. all year round.

22. The author implies that the usual age of marriage for a daughter of the country gentleman was:

1. during her early teens.
2. before she was twenty.
3. during her early twenties.
4. during her late twenties.
5. anytime between fifteen and twenty.

23. The rate of turnover among the families of gentlemen was:

1. non-existent.
2. very low.
3. low.
4. moderate.
5. rather high.

24. The author mentions all of the following as a form of recreation for the country gentleman except:
1. hunting.
 2. fishing.
 3. visiting other gentlemen.
 4. traveling to London.
 5. conversation with his tenants.
25. Assume that a family which has just risen to gentry status moves into a county. Then, most likely, the new family would be accepted socially by the older gentry:
1. only after the new family had lived one or two generations in the county.
 2. as soon as the new family became financially equal to the older families.
 3. only after the new family had become tied to older families by intermarriage.
 4. almost immediately, as long as the new family followed the older, established traditions.
 5. only after several generations on the land, or in some cases never.
26. The business aspects of running the affairs of the estate were handled by the:
1. eldest son.
 2. family lawyer.
 3. appointed manager.
 4. lady of the household.
 5. lord of the manor.
27. In this presentation, the story of Sir Edward appears:
1. after a description of the treatment of the younger sons of a country gentleman.
 2. after a description of the treatment of daughters of a country gentleman.
 3. after a description of the duties of wives of country gentlemen.
 4. before a description of different types of country gentlemen.
 5. before a description of the gentry in the New World.

28. The speaker states that a country gentleman was likely to be a man of:
1. fire when action required.
 2. primarily passive tendencies.
 3. leisure.
 4. little principle.
 5. principle, but little action.
29. Heraldry involved the study of:
1. soil fertility.
 2. old manuscripts.
 3. genealogy.
 4. political affairs.
 5. horse breeding.
30. The author states that the country gentleman was often a collector of:
1. old manuscripts.
 2. paintings.
 3. stamps.
 4. old maps.
 5. hunting trophies.
31. The country gentleman's attitude toward financial matters is best characterized as:
1. extremely thrifty.
 2. liberal only towards family members.
 3. liberal only toward family, servants, and neighbors.
 4. extremely liberal toward all elements of society.
 5. wasteful and extravagant.
32. When poor were taken care of by the gentry, it was through:
1. small taxes levied on property.
 2. small taxes levied on each tenant.
 3. special money set aside by each family.
 4. gifts at times of family successes or misfortunes.
 5. special grants from the king.

33. With which one of the following statements about the country gentleman would the speaker be likely to agree?
 1. They were generally cultured people and had a lasting influence on English society and customs.
 2. They were generally cultured people, but their influence on English society was confined to the 17th and 18th centuries.
 3. They were sometimes cultured people, but their violent pursuit of power had a lasting influence on English society.
 4. In rare instances they were cultured people and their negative influence on English society is felt today.
 5. In all cases they were cultured people who established the artistic and cultural climate of England for several centuries.
34. The author implies that the fall from fortune of a gentleman's family would most likely be due to:
 1. living beyond their means.
 2. antagonizing political foes.
 3. opposing their parents.
 4. failure of crops.
 5. opposition from the church.
35. The occupations in which a country gentleman might engage:
 1. were limited to farming and politics.
 2. were of a wide variety.
 3. were primarily indoor in nature.
 4. required a university training.
 5. required political favor.
36. Judging from its use in the presentation, the word "encumbered" means:
 1. run-down.
 2. barren.
 3. accused of a crime.
 4. indebted.
 5. extravagant.

37. Judging from the style of the selection, it is most likely that:
1. The author wrote as a contemporary of country gentlemen during their period of rising to social and political prominence.
 2. The author wrote as a contemporary of country gentlemen during the prime of their social and political prominence.
 3. The author wrote as a contemporary of country gentlemen during their decline from social and political prominence.
 4. The author wrote as a contemporary of some historical period after the decline of country gentlemen.
 5. From the selection, there is no way of determining when the author wrote.
38. A successful country gentleman had to have a reasonably good knowledge of:
1. business practices.
 2. religious theory.
 3. political affairs.
 4. foreign affairs.
 5. literature and the arts.
39. The family arms were usually carved:
1. on the front door.
 2. over the front door.
 3. over the fireplace.
 4. in the dining table.
 5. in the dining hall floor.

When you have finished answering all questions on the answer sheet, place the questions and the answer sheet in the packet marked Part 2.

Thank you for participating in this study.

APPENDIX F

PILOT TWO STUDENT INFORMATION FORMS

APPENDIX F: PILOT TWO STUDENT INFORMATION FORMS

Information Sheet for the Control Group

Information Sheet

Provide the following information: ✓ the correct response.

Student ID # ____-____-____

Sex: Male ____ Female ____

Race: Black ____ Oriental ____ White ____ Other (Specify): ____

Age (as of last birthday): ____

Please rate the following questions based on the scale provided: Circle your response.

0--no opinion 1--strongly agree 2--agree 3--disagree 4--strongly disagree

1. I had no difficulty understanding the directions for the test.

0 1 2 3 4

2. I had no difficulty understanding the test questions.

0 1 2 3 4

3. The test questions were hard.

0 1 2 3 4

Information Sheet for the Experimental Group

Information Sheet

Provide the following information: ✓ the correct response.

Student ID # ____ - ____ - ____

Sex: Male ____ Female ____

Race: Black ____ Oriental ____ White ____ Other (Specify): ____

Age (as of last birthday): ____

Please rate the following statements based on the scale provided:

Circle your response.

1--no opinion 1--strongly agree 2--agree 3--disagree 4--strongly disagree

1. I had no difficulty in understanding the directions on the test sheets.

0 1 2 3 4

2. I had no difficulty understanding the test questions.

0 1 2 3 4

3. The test questions were hard.

0 1 2 3 4

4. Taped instructions were clear.

0 1 2 3 4

5. The material was easy to understand.

0 1 2 3 4

6. I think that I did well on the test.

0 1 2 3 4

7. The material was boring.

0 1 2 3 4

APPENDIX G

INSTRUCTIONS GIVEN STUDENTS IN THE EXPERIMENTAL GROUPS

APPENDIX G

INSTRUCTIONS GIVEN STUDENTS IN THE EXPERIMENTAL GROUPS

Instructions Given the 0% Compression Experimental Group

The presentation which you are about to hear describes the influences on social structure in England during the seventeenth century by two types of individuals. These are the yeoman and the country gentleman. Please listen closely, and try to remember as much of the information as you can. Remember, do not take any notes. At the end of the presentation you will be asked to answer some questions based on this selection. The presentation will begin shortly.

Instructions Given the 33% and 57% Compression Experimental Groups

Within recent years a tape recorder was invented which allows us to reproduce recorded speech at speeds which are faster than the original rate without distorting the original pitch.

The average rate of recorded speech is 175 words per minute. Good comprehension of time-compressed speech at rates in excess of 275 words per minute have been reported by some researchers. Compressed speech has been used in education to pace and improve the speed of reading, and in the presentation and review of lectures.

The presentation which you are about to hear describes the influences on social structure in England during the seventeenth century by two types of individuals. These are the yeoman and the country gentleman.

This presentation has been recorded at a time-compressed rate. In order to acquaint you with time compressed speech, the recording will begin with a two and one-half minute introduction to the presentation which has been gradually speeded up to a designated compression rate. You won't be asked any questions about this introductory section. Please listen closely to the presentation, and try to remember as much of the information as you can. Remember do not take any notes. At the end of the presentation you will be asked to answer some questions based on this selection. The presentation will begin shortly.

APPENDIX H
SUBJECT ATTRITION

Appendix H

Subject Attrition

Type of Student			
	Developmental	Non-Developmental	Total
Subjects Meeting Study Guidelines	100	87	187
Subjects Completing Post Test	90	81	171
Subjects Completing Delayed Post Test on 14th Day	64	67	131
Subjects Participating in the Data Analysis*	60	60	120

Note: Attrition of subjects who participated in the study was due to termination of course enrollment, absenteeism, submission of incomplete answer sheets, failure to complete participation in the treatment session, or failure to take the delayed post test on the fourteenth day.

* Equal cell sizes were created for the purposes of the data analysis, the Lindquist Type III ANOVA. Since the smallest intact group contained twenty subjects, each of the remaining groups were reduced to this size by random selection.

APPENDIX I

DEMOGRAPHIC DATA FOR DEVELOPMENTAL STUDENTS

APPENDIX I: DEMOGRAPHIC DATA FOR DEVELOPMENTAL STUDENTS

	* College		** Subjects	
	n	%	n	%
Age:				
17-21	960	33%	35	55%
22-25	707	25%	13	20%
26-30	550	19%	11	17%
over 30	672	23%	4	06%
unspecified	0	0%	1	02%
Sex:				
Female	1311	45%	42	66%
Male	1578	55%	22	34%
Race:				
Black	449	16%	34	53%
Oriental	1133	39%	0	00%
White	817	28%	27	42%
Other	490	17%	3	05%
Unspecified	0	0%	0	00%

Total Subjects n = 64

Total College n = 2889

*Represents students enrolled in developmental English Summer Quarter 1980-Winter Quarter 1981.

**Represents students who received the post test and took the delayed post test on the fourteenth day following treatment.

APPENDIX J

DEMOGRAPHIC DATA FOR NON-DEVELOPMENTAL STUDENTS

APPENDIX J

DEMOGRAPHIC DATA FOR NON-DEVELOPMENTAL STUDENTS

	* College n	%	** Subjects n	%
Age:				
17-21	1760	32%	11	17%
22-25	1296	24%	17	25%
26-30	1061	20%	15	22%
Over 30	1329	24%	22	33%
Unspecified	0	0%	2	03%
Sex:				
Female	3034	56%	41	61%
Male	2411	44%	26	39%
Unspecified	0	0%	0	00%
Race:				
Black	742	14%	13	19%
Oriental	530	10%	3	05%
White	3712	68%	49	73%
Other	462	8%	2	03%
Unspecified	0	0%	0	00%

Total Subjects n = 67

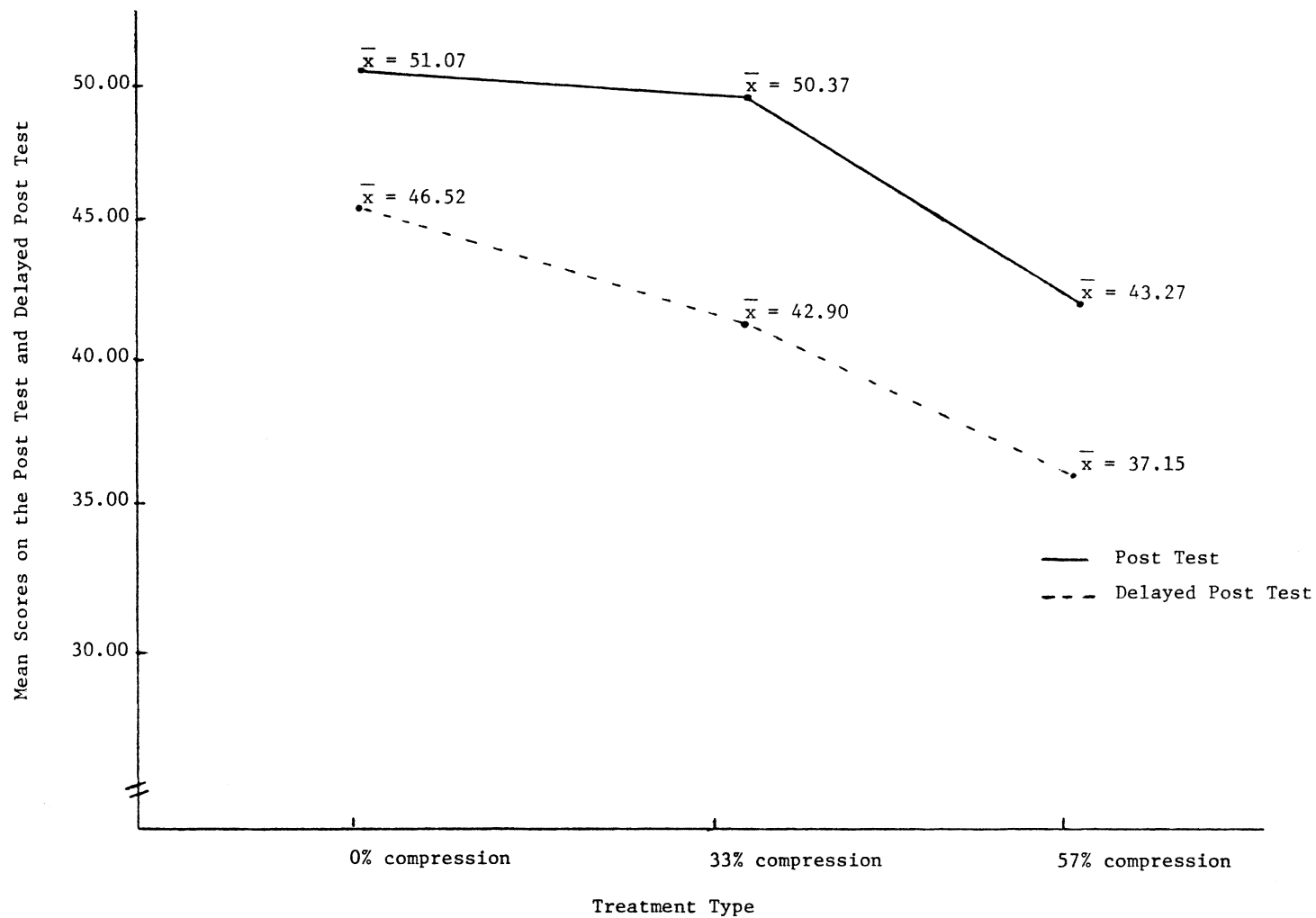
Total College n = 5446

*Represents students enrolled in non-developmental English courses
Summer Quarter 1980-Winter Quarter 1981.

**Represents students who received the post test and took the delayed
post test on the fourteenth day following treatment.

APPENDIX K

GRAPHIC REPRESENTATION OF THE DECLINE IN LISTENING COMPREHENSION
FOR A COMPRESSED SPEECH PRESENTATION BY TREATMENT TYPE



Appendix K - Graphic Representation of the Decline in Listening Comprehension for a Compressed Speech Presentation by Treatment Type and Time of Testing

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A STUDY OF THE EFFECTS OF COMPRESSED SPEECH
ON THE LISTENING COMPREHENSION OF COMMUNITY COLLEGE
STUDENTS

by

David Lawrence Williams

ABSTRACT

The purpose of the study was to determine the effects of various rates of compressed speech instruction upon the listening comprehension of community college students. The primary objective of the study was to determine the degree to which two types of community college students, developmental and non-developmental, could recall factual and inferential information from an uninterrupted forty-two minute presentation which had been compressed to: 0% (175 words per minute), 33% (275 words per minute), and 57% (400 words per minute). The ability of each type of student and treatment type to recall information over time was measured. The study was conducted at a large urban community college in the Winter and Spring of 1980. One hundred thirty-one developmental and non-developmental subjects participated in the study. These two classifications of students were randomized into one of three groups. The three experimental groups heard the treatment material presented at a designated compression rate, and took a treatment post test. All experimental subjects took a delayed post test two weeks following treatment. The scores of one hundred twenty participants were used in the Lindquist Type III analysis of variance with repeated measures which was conducted on the post tests and delayed post tests.

The results of the data analysis revealed significant differences in type of treatment, type of student, and time of testing with the following results: (1) subjects hearing the presentation at 0% compression had the highest scores. There was no significant difference between the scores of the 0% and 33% treatment groups. (2) non-developmental subjects scored significantly higher than developmental subjects on the treatments and (3) scores on the post test were significantly higher than the delayed post test.