A STUDY IN THE USE OF COMPRESSED

SPEECH FOR THE PRESENTATION

OF RADIO NEWS

By

CLIVE J. KINGHORN
//

Bachelor of Science
Brigham Young University
Provo, Utah
1966

Master of Arts
Ohio University
Athens, Ohio
1967

A STUDY IN THE USE OF COMPRESSED

SPEECH FOR THE PRESENTATION

OF RADIO NEWS

Thesis Approved:

_____
Thesis Adviser

_____

_____

_____
Dean of the Graduate College

1041515

ACKNOWLEDGMENTS

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

PRESENTATION OF THE PROBLEM

Introduction

The proliferation of news and information available to,
and desired by, the broadcast media consumer presents a sig-
nificant problem to news directors and producers. The
question of how to present the maximum amount of news in
the limited time allotted to newscasts on most radio sta-
tions is a perplexing one. At the present time, the
standard method is a newscaster reading prepared newscopy
supplemented by audio "actualities," voice reports, in news
blocks of five, fifteen, or thirty minutes.

One possible answer would be to increase the rate of
delivery. Most people speak at a slower rate than their
listener's capability to receive and process information.
The average rate of speech ranges between 125 and 175 words
per minute (wpm), yet few people read visually as slowly as
175 wpm. The consumer of broadcast news receives spoken in-
formation at a much slower rate than he could visually read
it. A study comparing newspaper and television news found
that each minute of newspaper reading was equivalent to 1.82
minutes of television viewing.[1]

Broadcasters, particularly those in radio, have tried to take advantage of the speed with which they are able to make news available to the mass media consumer. News processing and delivery speed are a definite advantage to broadcasters in their "competition" with the print media for the consumer's attention; the amount of news is not. The only real attempt by broadcasters to increase the amount of news has had to do with increasing the amount of time allotted for each news broadcast. The rate of news presentations has not changed very much over the years, if at all.

Compressed Speech

The possibility of increasing the rate of delivery of oral messages, thereby increasing the amount of information, has been under study for a number of years by researchers. Compressed speech as it is called (it is also known as speeded speech, rapid speech, accelerated speech, or time-compressed speech) is speech in which the word rate has been increased.

A basic problem in developing compressed speech was to find a way to increase word rate while, at the same time, holding the pitch as close to normal as possible.[2] Electronic devices now available allow recorded messages to be "compressed" to faster rates than normal while pitch is held near to normal. The process involves several steps: (1) the original recording is run through the compressor; (2) the compressor records portions of the original recording,

omitting others; (3) the compressor plays back the compressed recording which it has made; (4) the compressed message (the output from the compressor) is recorded on another tape recorder.[3]

A study has shown that a compressed rate of 207 wpm was preferred to the normal rate and that subjects had difficulty noticing that the message had been compressed at speeds up to 220 wpm.[4] Comprehension has been maintained up to 275 wpm at which point comprehension declines rapidly. It has also been shown that practice enables one to increase his "listen-ability" to compressed speech.[5]

The potential exists that compressed speech could be a way of providing radio broadcasters with a means of presenting more information in the present time structure of newscasts. The continued use of compressed speech by radio broadcasters would depend, for the most part, on the reaction of the consumer. If the newscast utilizing compressed speech is acceptable, if the consumer can understand and comprehend the information, if the newscast can maintain its credibility, then there are positive implications for the use of compressed speech in radio news.

Statement of the Problem

This study seeks to demonstrate a practical application of compressed speech in the presentation of radio newscasts. Briefly stated, the problem is to determine effects of compressed speech on listener acceptance of a radio newscast.

The newscast referred to throughout this study is five minutes in length. This newscast length is utilized by many radio stations throughout the United States.

Purpose of the Study

The purpose of this study is to examine the relationship between compressed speech and the acceptability, comprehension, recall, and credibility of radio news broadcasts.

The specific purposes of this study are:

    1. To determine whether a listening audience will accept newscasts compressed at various rates.

    2. To determine whether comprehension and recall of newscast stories are affected when compressed and presented at various rates.

    3. To determine whether newscast credibility is maintained with compressed speech.

The outcome of this research can have important implications for those responsible for broadcast news.

Definitions

Compressed speech -- speech in which word rate has been increased from the normal rate.

Actualities -- audio segments that feature a correspondent report or a "newsmaker's" statement.

Acceptability -- being received favorably or with approval.

Credibility -- the quality of inspiring belief or confidence.

FOOTNOTES

[1]Theodore L. Glasser, "Time-Compressed News, A Socio-Technological Forecast," A dissertation proposal (unpublished), March 1975, p. 4.

[2]Emerson Foulke and Thomas G. Sticht, "Review of Research on the Intelligibility and Comprehension of Accelerated Speech," _Psychological Bulletin_, 72 (1969), pp. 50-62.

[3]Charles M. Rossiter, Jr., "Some Implications of Compressed Speech for Broadcasters," _Journal of Broadcasting_, XV, No. 3 (Summer 1971), p. 304.

[4]Ibid.

[5]Ibid.

CHAPTER II

REVIEW OF LITERATURE

Introduction

For a researcher interested in the field of speech compression, there are several excellent sources from which to begin. But one of the dilemmas of speech compression research is the variety of terminology used by researchers.

There are a number of completed studies involving compressed speech, its development, and practical application. An extensive and ongoing list of authors and studies could be compiled but the purpose of limiting the citations to "major contributors" is to make this review concise and meaningful. It should be noted that the final determination of those authors and studies to be included are the selection of the author. The determination was made after a thorough review of the available literature on the subject, and does not claim to be all-inclusive.

The number of studies available on the utilization and implications of compressed speech as it relates to broadcasting is limited due to the apparent lack of investigation and research in this specific area.

6

Sources

It is appropriate at the beginning of this chapter to note the key sources that have provided information about compressed speech for this study. These contained extensive bibliographic references and provide a starting point for anyone interested in this area.

The foremost resource for the study of compressed speech is Sam Duker's three volume anthology, Time-Compressed Speech: An Anthology and Bibliography. This anthology contains studies and articles covering the theory and fundamentals, research and development, practical application, and patents involving compressed speech.[1]

Another source of information on compressed speech and its application is the research completed by Emerson Foulke. He is associated with the University of Louisville's Perceptual Alternatives Laboratory and the Center for Rate Controlled Recordings (CRCR). The initial interest of Foulke was the utilization of compressed speech by the blind. One major contribution of Foulke was the organization of the First Louisville Conference on Time Compressed Speech. At this three-day conference, papers were presented, discussions conducted, and recommendations developed for further research. Out of this conference and the Second Louisville Conference in 1969, two publications were prepared which contain excellent bibliographic references.[2]

CRCR produces a newsletter that contains abstracts of recently completed research, research underway, descriptions

of compression equipment, bibliographic material, and other developments in the area of compressed speech. The Center also provides service to researchers by preparing compressed tapes and other ready-made listening and test materials.[3]

Herbert L. Friedman and David B. Orr have co-authored a number of publications including Further Research on Speeded Speech as an Educational Medium. This report, in which Orr was the principal investigator, brought together all the related experiments conducted by Friedman and others over a two-year period. The experiments were stimulated by a U.S. Office of Education grant and covered a wide range of variables pertinent to educational applications of compressed speech.[4]

For a long time, the only known means for increasing the rate of delivery of radio news was to increase the speaking rate of the newscaster. This "speaking rapidly" method has a number of limitations, however, including the ability of the speaker and the physical constraints placed on the human vocal organs. As Foulke put it, "When a speaker attempts to operate his speech machinery at a rate that is faster than normal, it begins to malfunction."[5]

But this "speaking rapidly" method made it easy to classify the delivery rate. The number of words spoken were simply counted and that number was divided by the amount of time needed to speak all the words. This resulted in a words per minute rate (wpm). One merely spoke faster or slower to achieve the desired rate.

But a common problem that one encounters in compressed speech research is that different terms are used in specifying the amount of compression. Using such terms as "85 percent of normal listening time" or "275 wpm" does not accurately represent speech at equivalent rates from one speaker to another. Output rate depends on the input rate, rate of speaking, speaker vocabularly, etc. Foulke and Sticht have pointed out that, "There is no normal word rate that can safely be assumed since there is considerable variability in the published estimates of normal word rate."[6]

There is little, if any, unanimity among researchers as to which classification is the most accurate or preferred. Counting phonemes is very difficult and time consuming. Foulke and Sticht, justifying their endorsement of wpm, state, "Specification in terms of syllable rate is even more precise, but in most cases, the gain in precision is not worth the cost in time or effort." They explained their preference for word rate as "...the most meaningful dimension in terms of the cognitive and perceptual processes of the listener."[7]

The earliest mentioned authority on altering the oral rate of presentation was Harry Goldstein who was comparing the efficacy of written and oral materials. In his study, the auditory rate was controlled by the reader's ability to increase his rate of speech and by acceleration of a phonograph.

One reported result that stimulated subsequent research

was the assertion by Goldstein that, "listening comprehension is reliably superior to reading comprehension although quantitatively the difference is very slight."[8] The findings of particular importance to compressed speech research dealt with differentials in comprehension as a function of rate. Goldstein's findings provided the empirical seed of encouragement which generated further research efforts.

Ralph G. Nichols provided a continuing emphasis of the theory which supports the concept of compressed speech. Nichols, whose main area of interest was listening comprehension, conducted no systematic research to verify his idea but provided the theoretical base for numerous studies. It was Nichols contention that man could process information approximately four times faster than the rate he normally receives it aurally. This drew attention to what appears to be a discrepancy between the speed of speech and the speed of the thought process.[9]

The distinction of being the first to compress speech by removing segments of words and abutting the remaining parts goes to William D. Garvey. Garvey reasoned that it would be possible to physically remove small segments of speech and play the remainder, compressing the total speech time but leaving the original frequencies unaltered. To test this "chop-splice technique," he prepared a tape on which speech had been recorded by periodically cutting out short segments of tape, and by splicing the ends of the retained tape together again. Reproduction of this tape achieved the desired

effect but the method was cumbersome and time consuming, making it impractical for increasing word rate.

Garvey was primarily concerned with intelligibility and used a list of words rather than connected discourse. His study found that better than 95 percent intelligibility was obtained for increases of 1.5, 1.67, 1.75, and 2.0 times normal (1.0). Intelligibility dropped drastically at 1.75 when compressed by the frequency shifting method. This method involved speech compression which increased the playback speed of a record or tape and resulted in a "donald duck effect."[10]

George A. Miller and J. C. Licklider studied the articulation (correct reproduction) of spoken, phonetically balanced words under varying conditions of interruption. This was accomplished by a switching arrangement that permitted a recorded speech signal to be turned off periodically during its reproduction. In addition to considering the number and frequency of interruptions, the proportion of the time the speech was on, and the degree of the interruptions, Miller and Licklider considered what they called the "picket fence effect." The effect they described was brought about by masking the silent intervals with noise which seemed to make the words sound continuous. No actual improvement in intelligibility was obtained by adding this noise, however.[11]

The need for practical equipment to accomplish speech compression became quickly evident to early researchers. Garvey's method accomplished the task at hand but in an impractical way. Grant Fairbanks, William L. Everitt, and

Robert P. Jaeger developed an electronic device for doing essentially what Garvey had done by hand. Their compression was accomplished by discarding, periodically, small segments of the material to be compressed. The discarded sample was brief enough that it did not contain an entire speech sound, and the retained samples were abutted in time.[12] Their invention was the breakthrough needed to allow the study of speech compression to progress past the theory stage.

With the development of his machine, Fairbanks conducted a number of studies, in collaboration with others. The studies served as prototypes for other studies.

Several studies have examined the rate of delivery of radio news but these studies were concerned with the "speaking rate" as the only method for increasing the amount of broadcast news. As was discussed earlier in this chapter, the ability to increase the "speaking rate," is only one method of controlling the word rate of recorded speech and it is obviously limited. Increasing the rate of narration not only results in distortion of speech with respect to vocal inflection but also in fluctuation of rate.

The pioneer research study involving "speeded speech" and broadcast news was completed by Harold E. Nelson. Nelson took five news stories and had five different newscasters make recordings of them at the rates of 125, 150, 175, 200, and 225 wpm. He found that there was no significant difference in comprehension of the messages at the different rates; however, on the basis of interest scores, it was concluded

that a rate of between 175 and 200 wpm was most suitable for radio broadcasts. His study utilized the "speaking rapidly" technique alluded to earlier.[13]

James J. Asher in his thesis research at the University of Houston studied the effect of three rates of delivery, 100 wpm (slow), 150 wpm (medium), and 200 wpm (fast) on listener comprehension of news commentary. Each newscast contained six stories taken from special-audience magazines. The results showed that the listener's comprehension varied significantly with the rate of delivery. The medium rate was more effective than the fast or slow rate. This study also utilized the "speaking rapidly" technique.[14]

A study on the effect of rate on recall and judgment of sources was completed by James R. Smith and William J. McEwen. Their study dealt with comparing multiple-topic messages of the sort typically found in a radio newscast and single-topic messages presented at various delivery rates. Recall test scores and newscaster evaluation scores were the dependent variables. A professional newscaster recorded the two messages at four rates (160, 190, 220 and 250 wpm). The results showed delivery rate to have a significant effect on recall scores, although no significant topic or interaction effects were noted. Delivery rate had a detrimental effect at and above the 190 wpm level for the multiple-topic message and at and above the 220 wpm level for the single-topic level. The results seem to indicate that an announcer could vary his rate of delivery from 160 to 190 wpm without significant loss

of recall or positive general evaluation in the multiple-
topic situations without experiencing detrimental rate
effects.[15]

John Bittner, G. Wayne Shamo, and Dennis J. Celorie
utilized a new technique, mnemonic joining, to study listener
comprehension. Unlike compressed speech where the actual
speaking rate is increased "electronically," mnemonic joining
overlaps portions of words and phrases usually falling at the
beginning and end of grammatical or auditory pauses. The ac-
tual speaking rate is unchanged but condensation results by
presenting certain portions of the message simultaneously.
The final compressed message, then, is an audio overlap of
two sections of tape, each played from a different recorder
into a third recorder, in which the second section is started
before the first has ended.

Mnemonic joining is normally used to condense radio com-
mercials but in this study by Bittner, Shamo and Celorie, six
language samples (400 words each) were prepared by mnemon-
ically joining each sample. An approximate compression time
of 25% (175 wpm, normal was 140 wpm) was achieved. An infor-
mation recall test showed that the mnemonic joining technique
communicated significantly less information than did the nor-
mal delivery.[16]

The review of available literature calls attention to
the published information pertinent to this study. The lack
of research in the particular area of this study again em-
phasizes the need for further investigation.

FOOTNOTES

[1] Sam Duker, _Time Compressed Speech: An Anthology and Bibliography in Three Volumes_ (New Jersey, 1974).

[2] Emerson Foulke, _Proceedings of the Louisville Conference on Time Compressed Speech_, October 19-21, 1966; and, _Proceedings of the Second Louisville Conference on Rate and/or Frequency Controlled Speech_, October 22-24, 1969. Both edited by Emerson Foulke, (Louisville, 1966 and 1969).

[3] Larry Ray Gill, "The Effect of Compressed Speech and Interim Activity on Comprehension" (unpub. Ed.D. dissertation, Oklahoma State University, 1975), p. 16.

[4] Herbert L. Friedman and David B. Orr, "Recent Research in the Training of Compressed Comprehension," _Proceedings of the Louisville Conference on Time Compressed Speech_, October 19-21, 1966, ed. Emerson Foulke (Louisville, 1966).

[5] Theodore L. Glasser, "Time Compressed News, A Socio-Technological Forecast," A dissertation proposal (unpub.), March 1975, p. 5.

[6] Gill, p. 18.

[7] Ibid, p. 19.

[8] Harry Goldstein, "Reading and Listening Comprehension at Various Controlled Rates," _Columbia University Contributions to Education_, No. 821 (New York, 1940).

[9] Gill, pp. 10-11.

[10] Ibid., pp. 11-12.

[11] George A. Miller and J.C. Licklider, "The Intelligibility of Interrupted Speech," _Journal of the Acoustical Society of America_, Vol. 22, pp. 167-173.

[12] Robert E. Jester and Robert M.W. Travers, "Comprehension of Connected Meaningful Discourse as a Function of Rate and Mode of Presentation," _The Journal of Educational Research_, Vol. 59, Number 7 (March 1966), p. 297.

[13]Harold E. Nelson, "The Effect of Varriation of Rate on the Recall by Radio Listeners of 'Straight' Newscasts," Speech Monographs, 15 (1948), pp. 173-180.

[14]James J. Asher, "An Experimental Study of Listener Comprehension of News Commentary When Rate of Delivery is Varied" (unpub. Master of Arts thesis, University of Houston, 1955).

[15]James R. Smith and William J. McEwen, "Effect of Newscast Delivery Rate on Recall and Judgment of Sources," Journal of Broadcasting, 18:1 (Winter 1973-74), pp. 73-78.

[16]John R. Bittner, G. Wayne Shamo, and Dennis J. Celorie, "Compressed Speech by Mnemonic Joining: A Negative Implication for Broadcasting," Journal of Broadcasting, 17:4 (Fall 1973), pp. 459-464.

CHAPTER III

METHOD AND PROCEDURE

Introduction

The purpose of this research was to investigate the use
of compressed speech in the presentation of radio news to
students enrolled in several sections of Marketing 3323, Con-
sumer and Market Behavior, at Oklahoma State University. The
question asked was: will radio newscasts utilizing compressed
speech result in a significant difference in acceptability,
comprehension and recall, and credibility over newscasts read
at a "normal" rate of delivery.

Rate classification may be expressed in one, or a com-
bination, of the following units:

1. Percent

    a. Percent of original time

    b. Percent compressed

2. Words per minute (wpm)

3. Syllables per minute (spm)

4. Phonemes per minute (ppm)[1]

For the purposes of this study, two units of rate were
utilized. The most convenient means of expressing the rate
of the newscasts was the percent of the original time. A

rate of 85% indicates that compression has reduced the time by 15% (the change in words per minute is not necessarily linear). In addition, words per minute was sometimes used to provide greater comparability with other research studies.

Hypotheses

Data were obtained by using a taped newscast, compressed to three different rates of compression, the use of group presentations, and evaluation instruments designed to measure differences in comprehension and recall, acceptability, and credibility. Differences were measured and analyzed statistically to test the following null hypotheses:

Hypotheses 1: There will be no significant difference in the average comprehension-recall scores between treatments.

Hypotheses 2: There will be no significant difference in the average acceptability scores between treatments.

Hypotheses 3: There will be no significant difference in the average credibility scores between treatments.

Limitations of the Study

This research was completed with a sample of subjects (S's) enrolled in a Marketing course offered in the College of Business Administration at Oklahoma State University. Oklahoma State University is a land grant university with an on campus enrollment of approximately 18,000 students.

The sample was limited to students enrolled in Marketing 3323, Consumer and Market Behavior, during the fall semester

1976. Generalizations from this study should be limited to similar populations characteristic to those students attending Oklahoma State University.

Sample Selection

Students enrolled in four different sections of Marketing 3323 were selected as S's for this study. This course was selected because of its availability and instructor cooperation. Sections one and two each had 27 students, section three had 50 students, and section four had 32. The responses of all 136 S's were utilized in this study.

Ninety-seven percent of the S's were classified as juniors and seniors. Just over fifty percent of the S's were enrolled as majors in the College of Business Administration (and included the following majors: Marketing, Advertising, Business Administration, General Administration, and Business) with the others being enrolled as majors in other departments throughout the University. Males comprised 74 percent and females 26 percent of the S's. The mean age of the S's was 21.

Materials

A 729-word newscast was used in this study. The newscast followed a standard broadcast news format and contained seven factual stories. Two of the stories utilized "actualities" taken directly from an American Broadcasting Company network newscast. The introduction copy to the stories was

transcribed from the newscast and was used verbatim in this study. The other five stories were taken directly from the United Press International broadcast wire.

The newscast was read by a professional newscaster, who was unknown to the subjects, and recorded on magnetic tape. This recorded newscast was then compressed from 154 words per minute (100%) to 183 wpm (85%), 208 wpm (75%), and 240 wpm (65%). These compressions were accomplished on a Vocom I speech compressor which is manufactured by the PKM Corporation, St. Paul, Minnesota.

A seven item, multiple choice test was utilized to determine comprehension and recall of the newscast material. One question was developed for each of the seven newscast stories. A pretest was conducted to determine if prior knowledge would influence this test. A selection of twelve students available in the Business Administration building, none of whom were included in the sample, were given the comprehension-recall test without having heard the newscast. Their average recall scores (1.25) were significantly lower than the S's. It was also determined from the results of the pretest that the questions were constructed in such a way that the S's understood the information desired. Question responses by the S's indicated that a high level of reliability of the instrument could be expected. The validity of the answers to the questions indicated that the questions had been adequately phrased. It was not deemed necessary to make an extended statistical analysis for the purposes of this study.

A semantic differential test instrument was also developed, which listed 16 adjective pairs on a seven-point scale, to determine acceptability and credibility of the newscast. The adjective pairs utilized were selected on the basis of their high factor loadings toward acceptability and credibility factors.

Some demographic information was solicited as part of the tests, i.e. age, sex, classification, major, along with two questions to determine S's exposure to compressed speech, and two questions were used to establish an opinion on the newscast's rate of delivery.

Procedure

One of the four newscasts was randomly selected and presented to each of the four sections of Marketing 3323 during a regularly scheduled class period. Three of the classrooms were identical in construction, the fourth was similar but larger in size. The acoustical properties of these rooms were typical of such rooms and more than adequate for listening. The S's had been meeting in these classrooms for several months and were acclimated to the surroundings. No subject sat closer than four feet nor farther than twenty feet from the playback tape machine.

The test material was distributed face-down to each subject. Next, the following instructions were read: "Please leave the sheets I've handed out face-down. Listen to this newscast. The speaking rate should be of no concern." Then,

the newscast was presented using a Wollensak solid state reel-to-reel tape recorder model 6200. Upon its conclusion, S's were given these instructions: "Now fill out the sheets that you have. The first two sheets are just instructions for the third, the other pages are self-explanatory."

S's completed the seven question comprehension-recall test by marking the answer they felt was most correct. S's then completed the 16 bipolar semantic differential adjective pair ratings which had been randomly listed with a seven-point scale. The pairs were also randomly alternated as to positive-negative valuations.

A transcript of the newscast and copies of the test instruments are included in the Appendix.

FOOTNOTE

[1]Larry Ray Gill, "The Effect of Compressed Speech and Interim Activity on Comprehension" (unpub. Ed.D. dissertation, Oklahoma State University, 1975), p. 19.

CHAPTER IV

RESULTS OF THE STUDY

Introduction

This study concerns the practical application of com-
pressed speech in radio newscasts. It was important to test
whether an audience's comprehension and recall was affected,
whether audience acceptability of a newscast would change
from one rate of compressed speech to another, and whether
newscast credibility was maintained at various rates of com-
pressed speech.

A professional newscast was recorded at 154 words per
minute and compressed and recorded at 183, 208, and 240 words
per minute. Each of the four recordings was assigned at ran-
dom to each of four sections of students in the same
Marketing course. Classrooms were similar in size, construc-
tion and accoustical properties. After listening to one of
the four newscasts each student completed a test measuring
comprehension and recall and a questionnaire designed to
measure a person's attitudes concerning acceptability and
credibility of the newscast.

A total of 136 students participated in this study. The
participants completed the evaluation instruments at the con-

clusion of the newscast. The scores of these evaluation in-
struments represent the participant's reaction and attitude
to the newscast material and newscast presentation. The
scores were used to test the hypotheses of the experiment
by means of the analysis of variance. Each of the hypotheses
has been repeated with the results of the statistical analy-
sis.

Statistical Analysis

Hypothesis 1: There will be no significant
difference in the average comprehension-recall
scores between treatments.

The compiled data for the participants performance on
the test instruments are presented in Table I for the treat-
ment groups taking the comprehension-recall test. The mean
scores for Group 1, Group 2, Group 3 and Group 4, were res-
pectively, 5.59, 5.59, 5.38, and 5.40 (the total number
possible was seven).

The analysis of variance yielded an F ratio of 0.351
(Table II). Rejection of the null hypotheses at the .05
level of confidence with 3 and 135 degrees of freedom called
for an F ratio of 2.68. Hence the experimenter failed to
reject the null hypothesis; the groups did not differ signi-
ficantly in their comprehension-recall test scores due to
varying rates of compression.

Hypothesis 2: There will be no significant
difference in the average acceptability scores
between treatments.

TABLE I

COMPILED DATA FOR GROUPS 1, 2, 3 AND 4

| | GROUPS | | | |
CATEGORY	Group 1 (100%) N = 27	Group 2 (85%) N = 27	Group 3 (75%) N = 50	Group 4 (65%) N = 32
Comprehension - Recall				
Mean*	5.59	5.59	5.38	5.40
Std. Deviation	1.05	0.971	1.12	1.31
Std. Error	0.202	0.187	0.159	0.233
Acceptability				
Mean*	4.61	4.39	4.43	4.00
Std. Deviation	0.657	0.520	0.625	0.855
Std. Error	0.126	0.100	0.088	0.151
Credibility				
Mean*	5.13	4.91	4.98	4.64
Std. Deviation	0.679	0.553	0.529	0.774
Std. Error	0.130	0.107	0.075	0.137

* Total number possible is seven

TABLE II

ANALYSIS OF VARIANCE TABLE FOR
COMPREHENSION-RECALL SCORES

Source	D.F.	Mean Squares	F-Ratio
Treatments	3	0.4487	0.351
Error	132	1.2768	
Total	135		

Presented in Table I are the compiled data for the participants performance on the test instrument for the treatment groups evaluating the acceptability of the newscasts. The mean scores were Group 1 (4.61), Group 2 (4.39), Group 3 (4.43) and Group 4 (4.00).

The analysis of variance yielded an F ration of 4.404 (Table III). Rejection of the null hypothesis at the .05 level of confidence with 3 and 135 degrees of freedom called for an F ratio of 2.68. Hence the null hypothesis was rejected because the groups differed significantly in their ratings of newscast acceptability between the rates of compressed speech.

> Hypothesis 3: There will be no significant difference in the average credibility scores between treatments.

TABLE III

ANALYSIS OF VARIANCE TABLE FOR
ACCEPTABILITY SCORES

Source	D.F.	Mean Squares	F-Ratio
Treatments	3	2.0049	4.404
Error	132	0.4553	
Total	135		

The compiled data for the participants performance on the instrument are presented in Table I for the treatment groups evaluating the credibility of the newscasts. The total mean scores for Group 1, Group 2, Group 3 and Group 4, were respectively, 5.13, 4.91, 4.98 and 4.64.

The analysis of variance yielded an F ratio of 3.28 (Table IV). Rejection of the null hypothesis at the .05 level of confidence with 3 and 135 degrees of freedom called for an F ratio of 2.68. Hence the null hypothesis was rejected because the groups differed significantly in their ratings of newscast credibility between the rates of compressed speech.

TABLE IV

ANALYSIS OF VARIANCE TABLE FOR
CREDIBILITY SCORES

Source	D.F.	Mean Squares	F-Ratio
Treatments	3	1.2979	3.280
Error	132	0.3957	
Total	135		

For the two dependent variables showing significant differences between groups, a further comparison of all possible pairs of group means was done using Duncan's Multiple Range Test (MRT). Duncan's MRT was utilized because it accomodates unequal group sizes. The analysis between group means on the acceptability scores (Table V) indicates the newscast recorded at 240 wpm (Group 4) was significantly less acceptable to its audience, at the .05 level of confidence, than the other three recording rates. The analysis between group means on the credibility scores (Table VI) indicates the newscast recorded at 240 wpm (Group 4) was significantly less credible to its audience, at the .05 level of confidence, than the newscasts recorded at 154 wpm (Group 1) and 208 wpm (Group 3).

TABLE V

DIFFERENCE OF GROUP MEANS
ON ACCEPTABILITY SCORES*

		Group	2	3	4
		Mean	4.3909	4.4333	4.0069
Group	Mean				
1	4.6132		.2223	.1799	.6063**
2	4.3909			.0424	.3840**
3	4.4333				.4264**

* The figure in the cell is the absolute differ-
ence of the column mean subtracted from the
row mean.

** Significantly different at the .05 level.

TABLE VI

DIFFERENCE OF GROUP MEANS ON
CREDIBILITY SCORES*

		Group	2	3	4
		Mean	4.9136	4.9755	4.6389
Group	Mean				
1	5.1317		.2181	.1562	.4928**
2	4.9136			.0619	.2747
3	4.9755				.3366**

  * The figure in the cell is the absolute differ-
    ence of the column mean subtracted from the
    row mean.

 ** Significantly different at the .05 level.

T-tests show no significant differences (α = .05) between comprehension-recall, acceptability and credibility scores and the sex of participants (Table VII).

TABLE VII

T-TEST STATISTICS BETWEEN SEX OF
RESPONDENTS FOR VARIOUS SCORES

Variable	Sex	Cases	Mean	T-Value
Comprehension- Recall score	Male Female	101 35	5.5248 5.3143	0.96
Acceptability score	Male Female	101 35	4.3883 4.2794	0.79
Credibility score	Male Female	101 35	4.8745 5.0317	1.25

The responses to four questions, included with the demographic questions, relating to delivery rate preference were not determined to be within the intended scope of this study and were, therefore, not included.

Summary

The participants in this study (N=136) were in four different classroom groups who listened to one of four newscasts,

three of which had been compressed. The subjects were administered both a multiple choice and a semantic differential instrument which yielded total scores used in testing the three hypotheses. The data generated were treated statistically through the analysis of variance tests. The comprehension-recall scores yielded less than significant F ratios which caused the experimenter to fail to reject the null hypothesis. The acceptability and credibility scores yielded significant ratios which resulted in the experimenter rejecting the two null hypotheses.

The compressed rates of speech did not significantly effect the listener's comprehension-recall of the newscast information as reflected by their scores on the test instrument. But the speech rate did significantly effect the ratings given by the subjects to the acceptability and credibility of the newscasts as indicated by the lower ratings given to the newscasts that were compressed.

CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Introduction

The preceding chapter reported the compiled data, the statistical treatment of that data and the inferences which were justified as a r-sult of the statistical analysis. The interpretation of the data was accomplished with the caution that characterizes a carefully developed research report.

The summary of the study is an attempt to state concisely how the experimental procedure was carried out. The conclusions and recommendations reflect, to a degree, the experimenter's concerns, questions, interpretations and suggestions.

Summary of the Study

A radio news broadcast was recorded at four different rates of compressed speech (treatments) and assigned at random to four classroom groups. The treatments were investigated for differences in subject scores on comprehension-recall of newscast information and subject ratings of newscast acceptability and credibility.

The newscast was prepared following generally accepted guidelines for a five-minute radio news presentation and was

recorded by a professional broadcaster. One hundred thirty-six students in four different sections of Marketing 3323, at Oklahoma State University, participated in the study. Only six participants scattered throughout the groups had been exposed to compressed speech previously. For all practical purposes, the participants were hearing compressed speech for the first time.

The controlled experimental sessions were conducted in similar classrooms during regularly scheduled class periods. S's listened to the newscast and were immediately tested utilizing both a multiple choice and a semantic differential instrument.

The treatments were analyzed for differences in subject scores and ratings. Credibility and acceptability scores were determined by averaging adjective pair ratings made by individual group members. Recall scores were determined by counting the number of correct responses given by each individual on the test instrument.

A Completely Randomized Design ANOVA was used to test treatment differences. The F ratios derived were utilized to test the three hypotheses. The comprehension-recall F ratio failed to reach a level which would allow the rejection of the null hypothesis at the .05 level. There were no significant differences in performance scores within or between groups due to treatment nor as the result of interaction of treatments and groups. The F ratios for acceptability and credibility both exceeded the F ratio which resulted in the

rejection of the null hypotheses at the .05 level. There were significant differences in these evaluative scores due to the treatments.

Duncan's Multiple Range Test was then applied to compare all possible treatment means. The newscast recorded at 240 wpm was found to be significantly less acceptable than the other three rates (154, 183, and 208 wpm). This same newscast was also found to be significantly less credible to its audience than the newscasts recorded at 154 and 208 wpm.

Conclusions

Subject to the limitations of this study, the following inferences and conclusions may be drawn:

1. Participants who listened to the compressed newscasts at 183 wpm (85%), 208 wpm (75%), and 240 wpm (65%) did statistically no better and no worse on the comprehension-recall test than those who listened to the tape at the normal rate (154 wpm, 100%).

2. Participants who listened to the compressed newscasts (183, 208, and 240 wpm) and evaluated them as to acceptability and credibility statistically rated them lower than students who listened to the tape at the normal rate (154 wpm).

3. A summary conclusion was that, on the basis of the findings of the research, listening time

could be saved through the use of compressed speech in the presentation of a radio newscast without significant loss of comprehension. However, the compressed newscasts are less acceptable and are less credible. This conclusion was a tentative one due to certain limitations which may have influenced the results.

Recommendations

The recommendations which follow have been categorized under two headings, Recommendations for Broadcasters and Recommendations for Future Research.

Recommendations for Broadcasters

1. The amount of news and information available to broadcast news departments is voluminous. The problem of getting as much of it as possible to the broadcast news consumer emphasizes the need to find alternative means to those presently being employed. Compressed speech hardware is available; the software needs to be developed. The implication of this recommendation places the responsibility squarely on the broadcaster to consider time-compressed newscasts as a means to increase the amount of news in any given period of time.

2. It is recommended that as compressed speech newscasts are considered and utilized that these newscasts be implemented on a gradually escalating scale of compression. This will help to "acclimate" the consumer to this, what will be for many, new kind of vocal presentation. One advantage of compressed-speech hardware is that compression can be done so slowly that one can suddenly be listening to faster delivery rates without realizing it.

3. It is recommended that broadcasters encourage and work with other information disseminators to utilize time-compressed speech. Some specific groups might include: libraries, educational institutions at all levels, professional organizations such as legal, medical, business, etc.

A general and widespread utilization of time-compressed speech in society as a whole would help remove any barriers to it being accepted as a logical extension of the electronic media. With an increase in acceptability should come a parallel in credibility.

Recommendations for Further Research

1. This study should be replicated under conditions which allow a higher degree of control than ex-

isted in this study. It would be desirable
to include a period of time for the partici-
pants to "practice" listening to compressed-
speech. The following questions suggest
potential areas of research in this regard:

    a. Can participants be "taught," through
        practice, to comprehend compressed-
        speech newscasts at rates exceeding
        normal delivery? Will such practice
        increase listener acceptability and
        credibility?

2. Age and geographical residence factors could be
    investigated to see if they are significant in
    affecting compressed sp-ech consumption (i.e.,
    would senior citizens or people living in
    regions in the United States where the normal
    speaking rate is much slower, the Southern
    states, have a more difficult time adjusting
    to or accepting compressed-speech newscasts?).

3. No attempt was made in this study to determine
    why the newscast was rated acceptable or un-
    acceptable and credible or uncredible. A
    determination of these values could be
    studied through all significant age groups
    of potential consumers.

This study investigated the potential use of compressed
speech in radio newscasting. Perhaps it can be adjudged

healthy that many questions were raised as a result of the findings of this study. This should encourage further inquiry. The end result should be beneficial to all concerned particularly broadcasters and consumers of radio news.

SELECTED BIBLIOGRAPHY

Asher, James J. "An Experimental Study of Listener Compre-
    hension of News Commentary When Rate of Delivery is
    Varied." (Unpub. M.A. thesis, University of Houston,
    1955.)

Bittner, John R., Shamo, G. Wayne, Celorie, Dennis J. "Com-
    pressed Speech by Mnemonic Joining: A Negative
    Implication for Broadcasting." Journal of Broadcasting,
    17, 4 (Fall, 1973), pp. 459-464.

Carver, Donald P. "Effect of Increasing the Rate of Speech
    Presentation Upon Comprehension." Journal of Educa-
    tional Psychology, 65 (1973), 118-126.

Diehl, Charles F., White, Richard C., Burk, Kenneth. "Rate
    and Communication." Speech Monographs, 26 (1959),
    229-232.

Duker, Sam. Time Compressed Speech: An Anthology and
    Bibliography in Three Volumes. New Jersey: The
    Scarecrow Press, Inc., 1974.

Enc, M. E. and Stowrow, L. M. "A Comparison of the Effects
    of Two Recording Speeds on Learning and Retention."
    The New Outlook for the Blind, 54 (1960), 39-48.

Ernest, Carole H. "Listening Comprehension as a Function of
    Type of Material and Rate of Presentation." Speech
    Monographs, 35 (1968), 154-158.

Fairbanks, G., Guttman, N., Miron, M. S. "Effects of Time
    Compression Upon the Comprehension of Connected Speech."
    Journal of Speech and Hearing Disorders, 22 (1957),
    10-19.

Foulke, Emerson. "Comparison of Comprehension of Two Forms
    of Compressed Speech." Exceptional Children, 33 (1966),
    169-173.

Foulke, Emerson. "Listening Comprehension as a Function of
    Word Rate." The Journal of Communication, 18 (1968),
    198-206.

Foulke, Emerson. <u>Proceedings</u> <u>of</u> <u>the</u> <u>Louisville</u> <u>Conference</u>
    <u>on</u> <u>Time</u> <u>Compressed</u> <u>Speech</u>. Ed. Emerson Foulke. Louis-
    ville, Kentucky: Center for Rate Controlled Recordings,
    University of Louisville, 1966.

Foulke, Emerson. <u>Proceedings</u> <u>of</u> <u>the</u> <u>Second</u> <u>Louisville</u>
    <u>Conference</u> <u>on</u> <u>Rate</u> <u>and/or</u> <u>Frequency</u> <u>Controlled</u> <u>Speech</u>.
    Ed. Emerson Foulke. Louisville, Kentucky: Center for
    Rate Controlled Recordings, University of Louisville,
    1969.

Foulke, Emerson and Sticht, Thomas G. "Review of Research
    on the Intelligibility and Comprehension of Accelerated
    Speech." <u>Psychological</u> <u>Bulletin</u>, 72 (1969), 52-62.

George, Robert Glen. "Retention of Prose Material as a
    Function of Rate of Presentation and Difficulty of
    Material." <u>AV</u> <u>Communication</u> <u>Review</u>, 18 (1970), 291-
    299.

Gill, Larry Ray. "The Effect of Compressed Speech and
    Interim Activity on Comprehension." (Unpub. Ed.D.
    dissertation, Oklahoma State University, 1975.)

Glasser, Theodore L. "Time Compressed News, A Socio-
    Technological Forecast." (Unpub. dissertation pro-
    posal, University of Iowa, 1975.)

Glasser, Theodore L. "Viewpoint: On Time Compressed News."
    <u>Journal</u> <u>of</u> <u>Broadcasting</u>, 20 (Winter, 1976), 127-128.

Goldhaber, Gerald M. "Listener Comprehension of Compressed
    Speech as a Function of the Academic Grade Level of the
    Subjects." <u>Journal</u> <u>of</u> <u>Communication</u>, 20 (1970), 167-
    173.

Goldstein, Harry. "Reading and Listening Comprehension at
    Various Controlled Rates." <u>Columbia</u> <u>University</u> <u>Con-</u>
    <u>tributions</u> <u>to</u> <u>Education</u>, No. 821 (New York, 1940).

Harwood, Kenneth A. "Listenability and Rate of Presentation."
    <u>Speech</u> <u>Monographs</u>, 22 (1955), 57-59.

Jester, Robert E. and Travers, Robert M. W. "Comprehension
    of Connected Meaningful Discourse as a Function of Rate
    and Mode of Presentation." <u>The</u> <u>Journal</u> <u>of</u> <u>Educational</u>
    <u>Research</u>, 59 (1966), 297-302.

Kerlinger, Fred N. <u>Foundations</u> <u>of</u> <u>Behavioral</u> <u>Research</u>. 2nd
    Ed. New York: Holt, Rinehart and Winston, Inc., 1973.

Miller, George A. and Licklider, J. C. "The Intelligibility
    of Interrupted Speech." <u>Journal</u> <u>of</u> <u>the</u> <u>Acoustical</u>
    <u>Society</u> <u>of</u> <u>America</u>, 22 (1950), 167-173.

Nelson, Harold E. "The Effect of Variation of Rate on the
     Recall by Radio Listeners of 'Straight' Newscasts."
     Speech Monographs, 15 (1948), 173-180.

Orr, David B., Friedman, Herbert L., Williams, Jane C. C.
     "Trainability of Listening Comprehension of Speeded
     Discourse." Journal of Educational Psychology, 56
     (1965), 148-156.

Orr, David B. and Friedman, Herbert L. "The Effects of
     Listening Aids on the Comprehension of Time-Compressed
     Speech." Journal of Communication, 17 (1967), 223-227.

Rossiter, Charles M., Jr. "Some Implications of Compressed
     Speech for Broadcasters." Journal of Broadcasting, 30
     (Summer, 1971), 303-307.

Rossiter, Charles M., Jr. "Rate-of-Presentation Effects on
     Recall of Facts and of Ideas and on Generation of In-
     ferences." AV Communications Review, 19 (1971), 313-
     324.

Shuell, T. J. and Keppel, G. "Learning Ability and Reten-
     tion." Journal of Educational Psychology, 61 (1970),
     59-65.

Smith, James R. and McEwen, William J. "Effect of Newscast
     Delivery Rate on Recall and Judgment of Sources."
     Journal of Broadcasting, 18 (Winter, 1973-74), 73-78.

Sticht, Thomas G. "Some Relationships of Mental Aptitude,
     Reading Ability, and Listening Ability Using Normal and
     Time-Compressed Speech." Journal of Communication, 18
     (1968), 243-258.

Sticht, Thomas G. "Comprehension of Repeated Time-Compressed
     Recordings." Journal of Experimental Education, 37
     (1969), 60-62.

Sticht, Thomas G. "Some Interactions of Speech Rate, Signal
     Distortion, and Certain Linguistic Factors in Listening
     Comprehension." AV Communication Review, 17 (1969), 159-
     171.

Voor, John B. and Miller, Joseph M. "The Effect of Practice
     Upon the Comprehension of Time-Compressed Speech."
     Speech Monographs, 32 (1965), 452-455.

Wheeless, Lawrence R. "Some Effects of Time-Compressed Speech
     on Persuasion." Journal of Broadcasting, 15 (1971), 415-
     420.

APPENDIXES

INSTRUCTIONS

The purpose of this study is to measure the attitudes of certain persons to a newscast by having them judge the newscast against a series of descriptive scales.

In taking this test, please make your judgments on what these things mean to you. On the following page, please rate the newscast on each set of scales.

If you feel the newscast is very closely related to one end of the scale, you should place your checkmark as follows:

good   _X_   ___   ___   ___   ___   ___   ___   bad

or

good   ___   ___   ___   ___   ___   ___   _X_   bad

If you feel the newscast is quite closely related to one or the other end of the scale (but not extremely), you should place your checkmark as follows:

good   ___   _X_   ___   ___   ___   ___   ___   bad

or

good   ___   ___   ___   ___   ___   _X_   ___   bad

If the newscast seems only slightly related to one side as opposed to the other side (but is not really neutral), then you should check as follows:

good   ___   ___   _X_   ___   ___   ___   ___   bad

or

good   ___   ___   ___   ___   _X_   ___   ___   bad

The direction toward which you check, of course, depends upon which of the two ends of the scale seems most characteristic of the newscast you are judging.

INSTRUCTIONS

If you consider the newscast to be neutral on the scale,
both sides of the scale equally associated with the newscast,
or if the scale is completely irrelevant, unrelated to the
newscast, then you should check the middle space.

Do not look back and forth through the items. Make each
item a separate and independent judgment. It's your first
impression we want.

N E W S C A S T

(C)*	SPECIFIC	___ ___ ___ ___ ___ ___ ___	GENERAL
(A)	UGLY	___ ___ ___ ___ ___ ___ ___	BEAUTIFUL
(C)	LOGICAL	___ ___ ___ ___ ___ ___ ___	ILLOGICAL
(C)	UNBELIEVABLE	___ ___ ___ ___ ___ ___ ___	BELIEVABLE
(A)	HONEST	___ ___ ___ ___ ___ ___ ___	DISHONEST
(C)	WEAK	___ ___ ___ ___ ___ ___ ___	STRONG
(A)	GOOD	___ ___ ___ ___ ___ ___ ___	BAD
(C)	SMALL	___ ___ ___ ___ ___ ___ ___	LARGE
(C)	FRIENDLY	___ ___ ___ ___ ___ ___ ___	UNFRIENDLY
(A)	HAZY	___ ___ ___ ___ ___ ___ ___	CLEAR
(A)	NICE	___ ___ ___ ___ ___ ___ ___	AWFUL
(A)	UNPLEASANT	___ ___ ___ ___ ___ ___ ___	PLEASANT
(C)	IMPRESSIVE	___ ___ ___ ___ ___ ___ ___	UNIMPRESSIVE
(C)	UNRELIABLE	___ ___ ___ ___ ___ ___ ___	RELIABLE
(C)	HEAVY	___ ___ ___ ___ ___ ___ ___	LIGHT
(A)	DIRTY	___ ___ ___ ___ ___ ___ ___	CLEAN
(A)	PLEASING	___ ___ ___ ___ ___ ___ ___	DISPLEASING
(A)	DULL	___ ___ ___ ___ ___ ___ ___	VIVID

* These indicate which were used for acceptability ratings
  (A) or credibility ratings (C). These were not included
  on the actual test instrument.

ON THE FOLLOWING QUESTIONS, CIRCLE THE LETTER OF THE ANSWER
YOU BELIEVE TO BE CORRECT ACCORDING TO THE NEWSCAST YOU HAVE
JUST HEARD.

1. The Carter transition team is asking the State Department for position papers on:

   a. fiscal policy
   b. domestic economic policy
   c. foreign policy

2. Senator Goldwater is in competition for:

   a. a foreign ambassadorship
   b. senate republican leader
   c. a senate committee chairmanship

3. The P-T-A recently discussed violence in a:

   a. congressional hearing
   b. public forum
   c. television symposium

4. Production of oil from oil shale can't be done without:

   a. help from the Middle East
   b. more financing
   c. environmental harm

5. Mr. Nixon calls government control of his papers:

   a. a violation of his constitutional rights
   b. a violation of the Ex-President's Personal
      Memoirs Law
   c. a violation of his right to privacy

6. A 14-year-old boy was shot:

   a. during a quick-draw contest
   b. while cleaning a loaded rifle
   c. after being mistaken for a prowler

7. Ford Motor Company is recalling some vans and club wagons because of:

   a. steering failures
   b. malfunctioning emission control devices
   c. defective brakes

Age _____

Circle One: Freshman   Sophomore   Junior   Senior

Major _____

Circle One: Male   Female

Have you heard compressed speech before? Yes   No

Have you participated in a study involving compressed
speech before? Yes   No

Was the rate of this newscast: ____ too slow

                                 ____ so slow that interest
                                      would be lost

                                 ____ about right

                                 ____ so fast that interest
                                      would be lost

                                 ____ too fast

What is the probability that you would listen to newscasts
at this rate of presentation: ____ never

                                 ____ rarely

                                 ____ occasionally

                                 ____ fairly often

                                 ____ frequently

VITA^

Clive J. Kinghorn

Candidate for the degree of

Doctor of Education

Thesis: A STUDY IN THE USE OF COMPRESSED SPEECH FOR THE
PRESENTATION OF RADIO NEWS

Major Field: Higher Education

Biographical:

Personal Data: Born in Rigby, Idaho, August 23, 1937,
the son of Mr. and Mrs. Wilmer C. Kinghorn

Education: Graduated from Rigby High School, Rigby,
Idaho, in May, 1955, received Associate in Arts
degree from Ricks College in 1964; received
Bachelor of Science degree in Communications
from Brigham Young University in 1966; received
Master of Arts degree from Ohio University in
1967; enrolled in doctoral program at the Univ-
ersity of Utah, 1969-70; completed requirements
for the Doctor of Education degree at Oklahoma
State University in July, 1979.

Professional Experience: Graduate Assistant, School of
Communications, Ohio University, 1966-67; Instruc-
tor of Radio-Television, Department of Journalism-
Broadcasting, Kansas State University, 1967-68;
Assistant Professor of Telecommunications and
Director of KTXT-FM, Department of Mass Communica-
tions, Texas Tech University, 1970-78; Program
Development Officer, Office of the Vice President,
Texas Tech University Health Sciences Center, 1978.