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THE EFFECTS OF USER CONTROLLED PRESENTATION RATE OF TELEVISION PROGRAMMING ON LEARNING COMPREHENSION, RETENTION, AND MOTIVATION: AN EXPLORATORY STUDY

The Ohio State University

PH.D. 1980

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THE EFFECTS OF USER CONTROLLED PRESENTATION RATE
OF TELEVISION PROGRAMMING ON LEARNING COMPREHENSION,
RETENTION, AND MOTIVATION: AN EXPLORATORY STUDY

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
Gerald Arthur Gochenour, B.S., M.A.

* * * * *

The Ohio State University
1980

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CHAPTER I

STATEMENT OF THE PROBLEM

Introduction

The rate at which a television program or an audio message is presented to the learner has traditionally been established by the producer of the program or by the narration.

Recent developments in video tape transport systems and audio pitch control have made it possible for the learner to control both the speed of the audio message and the corresponding visual images of a television program. The purpose of this study is to determine the relationships which exist between a learner's ability to control the rate of presentation of a television program and that learner's comprehension and retention of the subject matter presented, his level of motivation, and his attention to the learning task.

The effectiveness of television as a learning tool has been the subject of considerable research (Chu & Schramm, 1975; Reid & MacLennan, 1967) almost since the introduction of the medium. The bulk of this research has centered on the role of the medium in presenting direct
instruction. In this respect, television seems to be at least as effective as conventional teaching (Chu & Schramm, 1975)

There is a growing body of data which support the assumption that broadcast television is rapidly becoming the largest and most trusted source of information in the United States (Roper, 1978; Gallup, 1978). One thing seems to be certain, people do learn from television, and their behavior is influenced by television programming (Comstock, 1976; Loye, 1975; Reeves, 1977). The abundance of television programming available to the learner represents a vast store of information on virtually any subject. To date, most of the interest generated in television is in the area of entertainment. With the coming of new technology which will enable the viewer to control program presentation rate with little or no loss in image and sound quality, the full potential of television as a tool for learning as well as for entertainment may finally be realized.

To understand fully the functioning of television as a learning device, it must be understood that it is a multi-channel medium involving both the sense of sight and that of hearing. The viewer becomes involved with the interpretation of visual and auditory data which are often presented in rapid and confusing forms. Despite this tremendous input of data, the viewers, even small children,
usually experience little difficulty with interpretation (Anderson & Levin, 1977). In fact, there is some evidence to support that an increase in the number of channels of information input actually improves the recall ability of learners (Nasser & McEwen, 1976).

Recent increases in concern over the reading ability of school children has also produced interest in the process of listening (Arrasjid & Razik, 1973). Much of the research concerning the reading problem has stressed the value of listening training as a prerequisite for the successful acquisition of reading skills (Woodcock & Clark, 1968; Kuperberg, 1975). There is some evidence to indicate that increases in the rate at which a person can listen to recorded speech result in corresponding increases in the reading speed of the individual (Berg, 1977). A study by Platt (1977) which deals with the role of graphic imagery in language development lends more significance to the possibility that the visual image, especially when combined with associated audio information; may be a basic and primary means of communicating information.

The one significant weakness which television and film have shared has been the lack of user control over the rate of presentation of the information. This includes not only the ability to speed up presentation rate, but to, if necessary, slow it down. Both McCroskey and Thompson (1973), and Berry and Erickson (1973) point to the
advantage of slower presentation rates when working with young children or the auditorially disadvantaged.

Current technology has made both high and low speed variation possible, and there is every indication that future technology will make such manipulation of television programs widely available. Researchers have studied the possible benefits of compressed speech (Adelson, 1974; Primrose, 1975; Sewell, 1974; Woodcock & Clark, 1968) and have associated the ability to increase or reduce listening rate with increases in comprehension, motivation, and retention. It now seems important to study the learning effects of rate controlled television programming and to do so early in the technological development of the medium so that educators may have some input in design of both hardware and software and so that the effects of the new process can be studied and developed to their full educational potential.

Hypotheses

The exploratory nature of the study limits, to some extent, the exact definition of probable outcomes of the subject treatment. Within the known parameters of the topic area, the following hypotheses are presented.

Major Hypotheses:

1. When placed in a learning situation where they have the ability to manipulate the rate of presentation of a television program, learners will manipulate the rate of
program presentation.

2. Subjects who are allowed to manipulate the rate of program presentation will exhibit more motivation and attention to task than will subjects who cannot manipulate presentation rate.

3. Those subjects who are allowed to manipulate the rate of program presentation will exhibit greater learning comprehension and retention than will subjects without such control who view the same program at the normal viewing rate, as measured by scores on a standardized post-test.

4. Because all subjects do not learn at the same rates, different subjects who are allowed to manipulate program presentation rate will choose different playback rates.

Minor Hypotheses:

1. Those students who are allowed to vary the rate of program presentation will continue to vary the rate of the program throughout the viewing period.

2. The rate at which the subject will view the presentation will vary directly with the measured intelligence of the subject as determined by Iowa Test achievement scores for fourth grade subjects, and School and College Ability Test (S.C.A.T.) achievement test scores for secondary school subjects.

3. The rate at which the subject will view the presentation will vary directly with the measured reading level of the subject as determined by Iowa Test reading levels

Assumptions

The following assumptions are made with regard to this study concerning the subject sample.

It is assumed that the data from this study which applies to the subjects of the study will apply equally to similar populations of subjects.

The subjects of the study are assumed to be familiar with the medium of television and the various styles and characteristics of modern television programming. It is also assumed that the subjects do not have any such familiarity with compressed media, the equipment used in the study, or prior knowledge of the goals or design of the study.

It is further assumed that the motivation levels of the treatment groups and the comparison groups are equivalent, and subjects will exhibit no difference in performance, as measured by post-test scores, with regard to sex or race in either the comparison groups or the treatment groups.

It is assumed that test subjects experienced some motivation to manipulate the program due to the novelty of operating the equipment and observing the change in program rate produced by such manipulation.
Limitations of the Study

The major limitations placed upon this study are, for the most part, inherent to the exploratory nature of the topic area and the newness of the technology involved in the actual experimentation.

The study was designed to gather a broad spectrum of data concerning the educational effectiveness of rate controlled television and the effect such control has on the learner and the learning process. Attempts were made to state firm conclusions wherever possible, but the main purpose of the study was to examine the concept of controlled media and to collect data for more intensified research.

The general population which was studied in the experiment was limited to students at grade levels four, eight, and eleven. The specific sample was drawn at random from students at these grade levels in the Springfield Ohio City School System.

Another limitation on the study was the viewing environment of the participants. The design of the study required that the treatment be administered in three different school buildings during school hours. The equipment was set up in a private area in the building and the test students viewed the program and were tested individually. Control groups viewed the program together at each grade level and were tested together in their regular
classrooms. No standardization of the viewing environment was possible with the exception that the viewing areas were as similar as possible with regard to lighting, comfort, and privacy.

The design and quality of the experimental equipment placed another limitation on the study. At present, only one system is capable of giving the necessary control of the programming to the viewer while simultaneously controlling the pitch of the audio track. This equipment was specially modified for use in this study, and while it is simple to operate and very durable, some user orientation as to its operation was necessary, and all subjects may not have been equally competent and comfortable with its operation during the study.

Specialized Terms

The terms identified and defined below are unique to the field or to this study.

Compressed Speech. This term refers to the selective elimination or expansion of portions of an audio message through the use of a microprocessor which digitally encodes a message, eliminates or expands bits of the digital message and then decodes the message back into intelligible sound. The elimination or expansion of the digital message directly corresponds to the selected playback rate of the message. Use of this process controls the pitch of the playback message and eliminates or greatly reduces the
distortion which normally accompanies the playback of an audio message at a rate not equal to the rate at which the message was recorded (Dailey, 1974). This form of audio playback is also referred to as "variable speech control" by some manufacturers.

Compressed Media. This is a term referred to by Hartjen (1977) in his article introducing the concept of adapting visual media to compressed speech technology. Basically, it involves the act of the media user controlling both the rate of the visual image presentation and the audio presentation using some mechanical or electronic means to control the pitch of the audio message and the synchronization of the audio message to the rate of the visual presentation.

VSH Format. This term refers to one type of tape transport and loading system in wide use today. This system, used in 1/2-inch videocassette recorders made by many different manufacturers, forms an M-shaped tape path around the video heads of the recorder.

Beta Format. This term refers to a type of tape transport and loading system in use in some 1/2-inch videocassette recorders which do not employ the VHS system. These machines form a tape path around the video heads which is shaped like the Greek letter beta. Beta format machines and VHS machines are not compatible.
Summary

Recent improvements in tape transport design for video tape recorders and microprocessor technology enabling the compression and expansion of the audio output of video recorders now make it possible for the student to control the rate of viewing of television programming. Prior to this time, students had minimal control over the rate of presentation of any televised information. This exploratory study was designed to observe students who were given the opportunity to manipulate the rate of program presentation and to compare their comprehension of program material with students who were not given the opportunity to manipulate the presentation rate. Additionally, the study was designed to measure student acceptance of the equipment used and the manipulation process, and to determine possible problems which might arise as a result of the variation of the presentation rate.
CHAPTER II

REVIEW OF THE LITERATURE

The technological ability to compress or expand the viewing time of a television presentation makes it possible for the viewer to effectively control the rate of presentation of learning material. In addition, repetition of small or large sections of a presentation can be easily accomplished. The multi-dimensional nature of this type of learning activity encompasses many aspects of educational research and theory. This review will include the areas of general learning theory normally associated with the use of television for instruction and more specific studies which deal with the specialized aspects of compressed media and its educational impact.

Learning Theory

Education researchers have long been concerned with the series of steps through which a person passes in his development from infant to adult. Television, by virtue of its ability to present a vast array of material on a continuum ranging from preschool motor training to advanced college level courses, can influence a person's mental and
physical growth in the earliest developmental stages and remains a powerful force throughout the developmental process.

The learning types identified by Gagne (1978) provide an excellent basis with which the developer of instructional television programming may either analyze existing programming with regard to the learner's ability to respond to the data being presented or develop new programming aimed specifically at addressing learners who are operating at specific developmental levels, or who may need additional training in one or more of the types of learning identified. In a later work dealing with instructional design, Gagne and Briggs (1974) stressed the value of individualized learning and instruction over that of the group activity so common in the normal classroom. The key factor identified in stressing the importance of individualized instruction was the ability of the learner to control the rate of presentation. Although research dealing specifically with rate of presentation of television programming is scarce, studies dealing with varying rate of presentation seem to support Gagne and Briggs' contentions. In a study involving middle school students (Neville, 1975), presentations of visual/aural information at slower than average word rates produced better learning, especially with remedial readers. A study by Carver (1973) indicated that the rate of speech presentation should be under the
control of the learner. Additional studies (Berry & Erickson, 1973; McCroskey & Thompson, 1973) indicate that slower presentation rates benefit younger children and those students who are auditorially or verbally disadvantaged.

Television programming is often paced for attention getting or to hold the interest of the viewer. Sesame Street is a good example of programming which has come under criticism for the rapid pace of its material (Halpern, 1975). Although a recent study involving 72 four year olds (Anderson, Levin, & Lorch, 1977) who were presented specially designed "Sesame Street" programs at fast and slow rates with a third presentation of mothers reading to children found no evidence to support claims that fast pacing led to "hyperactivity, impulsivity, disorganized behavior, and shortened attention spans" (Anderson, Levin, & Lorch, 1977, p. 160), there is sufficient concern to warrant further research in program pacing and the rate at which programming is presented to the viewer.

The multi-sensory nature of television provides two channels through which the viewer gains informational input. Nasser and McEwen (1976) report that recall increases with an increase in the number of media channels. They further reported that subject involvement in or attention to the activity does not necessarily increase, which might indicate that increased recall is a result of
the increase in data presented through multiple channels alone. Perhaps the most difficult problem connected with television research is the lack of an adequate research base upon which to build television learning theory. Viewing a television program involves both visual observation and listening skills. In a paper delivered at the State University College of Buffalo, Arrasjid and Razik (1973) cited the need for more listening testing, training, and research. In a study of third and sixth grade students in Nashville (Woodcock, & Clark, 1974), increases in listening rates of students of varying IQ levels resulted in significant increases in immediate and delayed (1 week) recall for all levels. A later study (Woodcock, & Clark, 1974) reiterated these findings and went on to state that maximum comprehension of a listener occurs at 278 words per minute. A study by Kuperberg (1975) again cited the importance of listening skills, but found no significant difference in listening comprehension with changes in rate of presentation. It is significant to note that this study did not allow for user manipulation of rate.

Television Learning

Television as a learning tool has been the subject of much controversy from the time it was first introduced to the classroom in the late 1950's and early 1960's (Arafat, 1974; Comstock, 1975; Hartman, 1977; Reeves, 1977; Reid & MacLennan, 1967; & VanStolk, 1976). This controversy can
be divided into two areas of concern. First, the problems associated with the amount of time children spend viewing television and the content of broadcast programming, and second, the value of television in the school curriculum.

The overwhelming impact which television has had on our society has produced much negative comment on the influence which this impact has had on human behavior. The recurring themes of sex and violence are said to provide bad models for youth (VanStolk, 1976). Hartman (1977) sees television as a dictator which does not allow for two-way communication and calls for stricter control of the medium. A somewhat less negative approach to the problem is presented by Comstock (1975, 1977). He cites the Surgeon General's study concerning violence on television (Comstock, 1975) and proposes research in the area of television and the socialization of the young as a high priority. Comstock (1977) further calls for television regulation in the area of children and advertising, sex and violence, and voter influence. Not all studies of television's impact are negative. Gorney, Roderic, and Others (1976) report that viewing pro-social dramatic programs tended to decrease the aggressive mood of subjects, and Loye (1975) identified both pro and anti-social effects of television on adults. A study of college age students (Arafat, & Others, 1974) showed a slight, but not significant, negative influence on academic achievement.
correlated to hours of television viewing.

Much of the concern directed at television programming calls for programming regulation to reduce the negative effects of the media on youth (Comstock, 1976; Hartman, 1977). Comstock (1976), in a study of long-range impact of television, states that the effects of television, even those which are immediately observable, are long-range in nature because of the repetition factor. He further states that these influences may be cumulative or delayed in impact and may therefore be difficult to detect and isolate to television.

There can be little doubt that television influences our society, or that we need to further research these influences. It is important, however, to demonstrate that research also shows that the effects are not all negative. A study involving kindergarten, second, and fifth grade students (Klapper, 1974), applying Piaget's work in cognitive development, specifically the preoperational and concrete operational stages, reported that children do not consistently generalize from television to real life. A survey of pupils and teachers concerning television and viewing habits (Crawford & Rapoport, 1976) revealed that children prefer light entertainment to violent activity. Additionally, Reeves (1977) reported that his experimentation did not support his hypotheses that children were influenced behaviorally by pro and anti-social behavior in
television content.

The introduction of television to the classroom has produced many complex problems involving the interaction of the medium with the teacher, the student, and the learning environment. Television in the classroom can be considered to consist of two main categories of thought. First, broadcast television as a part of the curriculum, both in terms of its effects on society and the value of its content as learning information, and second, the use of the medium of television in the classroom environment. Also of significant importance is research in the mechanical aspects of the television image within the viewing setting, including, but not limited to, the size of the screen, distance from the screen to the viewer, audio quality, viewing angle, and image quality.

There is growing sentiment for the teaching of material dealing specifically with the mass media to all age levels of students. Lemon (1976) stated that consumer education regarding television viewing should stress a more critical approach to television commercials and general programming. Lemon cites direct parent/child discussion, teaching children to recognize patterns in television, criteria for establishing the reality of programming, and knowledge about the television industry as important elements of consumer television education.
The use of television in schooling and leisure time activities was the subject of a proposed research agenda submitted by Clark (1978) to the National Institute of Education. Clark identified the need to develop mental skills using television, design television literacy curricula, study the home viewing environment and its relationship to leisure time viewing and schooling, specifically children's use of time, and the degree to which children acquire knowledge from television. Comstock (1976) in a paper dealing with television and the teacher, stressed the need for teachers to take into account the influence of television on students and to use that influence as a learning tool.

A survey of pupils and teachers concerning television (Crawford & Rapoport, 1976) reported that approximately 38% of the teachers surveyed requested that students view a specific program at least once a month. The survey also revealed that 30-40% of students surveyed referred to television as an information source, and that at least one-third of the teachers responding would like to use more television in the classroom. In a study of television as an instructional tool, Purdy and Icenogle (1976) stated that media, because of its diversity, can be adapted and modified by teachers for selected use in their curriculums. In a more specifically directed study concerning the use of television as a learning tool, Leifer and Lesser (1976)
referred to the value of television in presenting career information to the students.

One of the greatest concerns of educators regarding television is the ability of children to comprehend the actual meaning and use of television programming without confusing dramatic events with reality. In an experiment involving 210 children in grades K through 2 (Storm, 1977), four types of television programming (news, drama, educational, and commercial) were shown to subjects. The results indicate that children understand most of what they see and hear on television, that they cognitively understand sophisticated information, and that more research should concentrate on comprehension of television. A study carried out by Hawkins (1976) which involved 153 first, third, and sixth grade students indicated that children's conception of reality on television is multidimensional and is dependent upon whether the character is a real life character or a fictional character, and upon the degree to which the characters and events are similar to expectations of the real world.

Sex differences with respect to television viewing were explored in a study of 200 college students who viewed both filmed and televised materials (Donohue, R. & Donohue, W., 1977). Results of this study seem to indicate some sex differences may exist. Female subjects organized both film and video tape more cognitively than did males, and females
expressed no preference for either media. Males seemed to prefer video tape to film.

The degree to which children pay attention to television was studied by Anderson (1977). He reports that both the learning environment and auditory attention are very important when considering this subject. He further states that children become "locked-in" to television and that the greater the length of the viewing time, the greater the locking, which he called "Attentional Inertia".

The development of cognitive skills through televised material was explored in a study by Henderson and Swanson (1977), and their results indicate that television programming which is based upon social learning theory and task analysis can be an effective means of teaching abstract rule-governing behavior to children.

The above study would seem to support contentions that television can be a useful tool in the classroom, yet the actual use of classroom televised instruction has met with much less than universal acceptance in the educational community. Perhaps one of the reasons for this lack of utilization of television stems from the lack of conclusive research concerning its value as an instructional device (Reid & MacLennan, 1976). The concept of "no significant difference" as it applies to television research was reevaluated by Chu and Schramm (1975). They explain that the fact that there were seldom significant differences
between television and other modes of presentation was due
to many factors not really associated with television, but
which were more closely related to the imperfection of
eyear experimental designs which often only used television
as a mean of bringing a lecturing teacher into the class­
room and did not utilize the medium's immense capacity for
bringing previously unattainable sources of information
into the classroom.

The Chu and Schramm analysis, in reviewing more recent
developments in instructional television went on to point
out that the increases in Iowa Achievement Test Scores in
Hagerstown, Maryland increased with the increased use of
instructional television; that television seems to be more
effective as a teaching tool in primary and secondary
schools than it is in advanced learning programs at the
university level; and that there is some indication that
pauses inserted in programming may improve the learning
taking place. This last finding seems to be related to the
pacing of the program material and the ability of the
learner to assimilate the information being presented to
him.

A study of the adult learner and television performed
by Forman and Richardson (1976) identified three types of
adult learner; goal oriented, activity oriented, and
learning oriented. Their study emphasized the need for
programming for adults to address these three types of
learners and for such programming to be well designed and supported. The study also included a typology of the roles of television in educational programs which was divided into teaching roles and programmatic roles such as student support and public information.

The confusion brought about by the lack of effective television research is part of the basis for calls for more standardization of evaluation instruments for instructional television programming (Friedlander, 1974) and for further research in instructional television (Sceiford, 1979). Sceiford specifically cites the need for research in how people learn from television, more effective message design, and reality based evaluation.

Much research in instructional television with regard to evaluation of learner response and programming effectiveness centers on eye movement studies and viewer attention studies. One experimental eye movement study (O'Bryan & Silverman, 1974) involving 30 nine to eleven year old subjects who were identified as being either poor or non-readers revealed that an actor on the screen draws viewer attention away from any pertinent print material. This study also determined that poor readers benefited from extra viewing time and repetition, while non-readers did not. This information again points to the value of a viewing system which allows the user control over rate of presentation and selective repetition of program segments.
A study of eye movement patterns by Baron and O'Bryan (1974) identified a three way interaction involving the medium, the individual learner, and the learning task. The study also gave considerable attention to earlier studies associating eye movement to intelligence (Guba; Wolf; & Light, 1964) and with regard to reading skill (Fleming, 1969; Tinker, 1968). Not all eye movement studies report favorable results. When used as an evaluative tool in a study of the effects of televised skill instruction and other factors on the development of cognitive skills, Henderson and Swanson (1977) reported that eye movement alone was not a sufficient indicator of learning.

Viewer attention to televised material was researched by Krull and Husson (1977) in a study utilizing programming from "Sesame Street" and "Electric Company". This study indicated that the level of viewer attention was higher for younger children, indicating that the age of a proposed viewer must be considered in developing programming which will maintain viewer attention. In another attention study, O'Bryan (1975) concentrated upon attention to the visual display and programming cues designed to direct attention to important information. The results of the study of viewers of "Electric Company" programs were that printed information should occupy the central position on the screen, that computer print is most effective, that the print should be stationary and not share the screen with
live actors, that the use of animation improves the effectiveness of the message, and that exact repetition and long exposure decreased the viewer's attention to the print.

In a study which was similar to that of O'Bryan in that it dealt with the composition of the television picture on the screen, Metallinos (1977) found no viewer preference with respect to the placement of visuals used in a news program with the exception that viewers preferred that whichever placement location was chosen, that it would remain consistent throughout the program.

In considering the question of student attitudes toward television as an instructional media, studies by Reid and MacLennan (1967) of available television research indicated that attitudes toward methods of instruction do not seem to affect measured learning. Similarly, a study by Nasser and McEwen (1976) concerning involvement of the viewer in multichannel media presentations resulted in no increase in viewer involvement as a result of increased channels of information, but the lack of increased involvement did not hinder the improvement of recall.

**Media Compression**

The ability to alter the rate of an audio or video presentation through the use of mechanical or electronic devices further expands the scope of the field of instructional media by allowing the user to select his own rate of presentation. This ability is further enhanced by
the ability of a learner to selectively repeat difficult or confusing segments of a program or specific parts of the program as a means of review or summary.

Research involving the compression of speech on audio tape began with the work of Miller and Licklider (1950). Their research involved the reduction of the actual audio message on tape by disconnecting the playback speaker for short intervals. They discovered that 90% comprehension of the message was retained until 50% of the actual message was removed. Of course, the actual message was not compressed, so no listening time was saved through the process. Three years later, Garvey (1953) produced a list of multi-syllable words which he then compressed by removing brief (40 microsecond) sections of the tape by manually cutting the tape and resplicing it back together with the edited section removed. This method of compression retained pitch without distortion, but was useful only for research purposes because of the large amount of time needed to compress the information manually.

Currently, most speech compression is accomplished by passing the audio signal through a microprocessor which digitally encodes the audio information, selectively eliminates a percentage of the message determined by a user operated control coupled to the motor of the recorder, and then decodes the abbreviated digital message back into audio form where it is processed by the normal amplifier.
circuitry of the recorder.

The need for research in the area of speech compression has been identified by a number of researchers (Dailey, 1973; Garvey, 1953; Littell, 1974). During the period preceding the development of low cost microprocessor units, these writings, with the exception of the work done by Garvey, were only expositions on the possible uses of speech compression. Some of the earlier research in speech compression directly applies to rate of learning studies. Among these, two of the most significant were Levine's (1974) studies of listener preference for rate of presentation and listening rate. Results of these studies concluded that, given the opportunity, children will manipulate the rate of presentation of material, that individuals choose different rates and show preferences for certain rates, and that these rates vary greatly with the individual. Levine also determined that children prefer listening to reading until reading can be successfully accomplished without taxing effort.

A study involving second grade students which measured listening comprehension of compressed and standard speech (Ihnan, 1975) seems to contradict claims that speech compression can be a valuable learning tool, in that this study measured no difference in comprehension between the compressed speech and standard speech. This study did not allow user manipulation of rate, nor did it consider the
factor of time saved by compressed listening. Therefore, there is some question as to the actual impact of subject motivation and also the maximum listening rate of the individuals tested. A more recent study involving 11th and 12th grade high school students (Berg, 1977) relating changes in reading speed with the use of compressed speech resulted in measurable increases in both reading speed and comprehension when students used compressed speech materials.

The point at which a listener can no longer maintain comprehension, the listening threshold, has been determined, through research, to be approximately 275 words per minute (Foulke, 1969). Between 190 and 275 words per minute, listener discrimination and comprehension increase; at greater listening speeds, both discrimination and comprehension begin to fall off. Sewell (1974), in a survey of research on compressed speech in attention research, substantiates this maximum rate with further citations and references to earlier research.

The problem of student preference for regular or compressed speech was studied by both Adelson (1974), and Primrose (1975). The Adelson study, which involved college students, stated that the students preferred the normal rate of presentation. Adelson cited the need for more study in the area of student preference. Primrose, also working with college students, cited a slight preference for
compressed speech by students and also commented on problems in note taking. His study also pointed out the value of compressed speech for quick review of material. These early experiments with speech compression were pioneering in nature and cannot be assumed to reflect the preferences of students who have access to modern portable speech compression equipment.

Compressed video involves not only the speeding up of the audio message, but also a corresponding increase in the rate of visual presentation. Little research has been attempted which involved a change in rate of both visual and auditory information. The newness of the available video technology required to produce compressed video has allowed no time for the results of research projects in this area to be made available.

Two early studies involving both audio and visual presentation at varied rates are the works of Nasser and McEwen (1976) which have already been reported in this review, and those of Woodcock and Clark (1968) which involved the presentation of high speed (compressed) audio material with accompanying slides. These researchers reported successful increases in learning by disadvantaged pupils using the multi-sensory materials at a higher than normal presentation rate.
The only literature available which deals specifically with the topic of compressed video is a paper by Hartjen (1977) which explores the possibility of compressing various forms of media and some of the learning possibilities offered by such compression.

The literature dealing with manipulation of the rate of presentation of learning material by the user is very supportive of the notion of user control of the rate of presentation. There seem to be obvious advantages to slower rates for some learners, especially those with learning problems or those who are learning difficult and complex material. There seem to be equal advantages for being able to increase the rate of presentation for some learners with above average learning skills or those who are highly motivated but restricted by time due to the large quantities of material they must cover.

The processes by which a person learns from television are not yet clearly understood, and the added complexity of allowing the user to control the rate of presentation of video programming may only serve to complicate issues such as multisensory presentation, program impact, the social merit of television, and the design of the television image. It may well be, however, that by allowing the user more control over the medium, we will eliminate or reduce many of the differences which separate television from more conventional sources of information such as reading, direct
lecture, and direct demonstration.

Summary

There can be no doubt that television has become an increasingly significant influence upon our society. The role of television in the learning process and the effects of television programming on the learner have been the subject of much research, and a topic of concern to educators and parents. Although much of this research has resulted in contradictory or non-significant findings, it seems to be an accepted fact that television can be an effective learning tool when programming is effectively designed and presented.

Studies dealing with the compression of an audio message, like those dealing with television, have been somewhat contradictory in their findings, but indicate that allowing the learner to vary the rate of listening to the audio message increases the learner’s comprehension and retention of the material. For some learners, this may mean slowing down the rate of presentation, for others, speeding up the rate of presentation, but whichever the learner chooses, the ability to control rate seems to increase both attention and motivation.

New developments in television and speech compression technology indicate a need to explore the effects which user controlled rate of television program presentation may have on learning and motivation.
CHAPTER III

DESIGN AND METHODOLOGY

Overall Design

The initial task in the design and performance of the study involved the selection of a videocassette recorder which allowed the speed of the program to be varied while in the playback mode, and the modification of the recorder to provide audio pitch control for the various playback speeds. This modification required the insertion of a speech compression module into the audio output electronics of the recorder.

After the selection and modification of the videocassette recorder, an exploratory study was designed to test both the hypotheses set forth in chapter one and the effectiveness of the modified video playback equipment.

A diagram showing the layout of the subject selection and grouping for the study is shown in Figure 1. All selections, including school, class, and the division of subjects into comparison and rate varying treatment groups were made through random selection. The pilot groups did not view the television program, but were simply
Subject Selection and Grouping

Figure 1
administered the post-test. This was done to check the post-test for content, structure, and common knowledge. Those schools from which the pilot classes were chosen were not considered in the selection of the treatment subjects' schools.

**Population and Sample Selection**

The population to which the results of this study are to be generalized includes normal students at fourth, eighth, and eleventh grade levels. It would be desirable to study all grade levels, special students, and adults, but in order to limit the scope of this research to manageable levels, the study has been limited to these three grades.

The grades selected have been chosen because they represent subjects with sufficient motor skills to manipulate test equipment with minimal difficulty, and they represent a cross section of the student population ranging from upper elementary through high school.

The specific sample groups were drawn from the student population of the Springfield Ohio City Schools. Three schools, each containing one of the selected grade levels were chose at random from the list of schools in the system. Springfield has seventeen elementary schools, five junior high schools, and two senior high schools. The city has a population of approximately 80,000; student population in the city school system is approximately 13,000.
City schools achieve racial balance through a combination of voluntary transfer and busing.

Within the three schools selected for the study, one class at each selected grade level was randomly chosen from a list of classes in the building. The elementary class selected was a single teacher, self-contained unit. Junior and senior high school classes were chosen from eighth and eleventh grade English classes, due to the content of the test program.

Each class selected was randomly divided into a rate varying group and a comparison group. This procedure was used to help to control for the possible effect of individual teachers on test groups and to help to retain the cross sectional nature of the sample selection.

Subject Data Profiles

A data profile was constructed for all rate varying subjects involved in the study. The grade level distribution of the 70 students in the total sample was 24 fourth grade students, 23 eighth grade students, and 23 eleventh grade students. The data profile for each subject included their most recent achievement test scores; age, race, and sex data; and most recently measured reading levels.

Achievement and reading scores for fourth grade subjects were taken from Iowa Achievement Test data. Students were given these tests in October of 1979. Achievement and reading level scores for eighth grade subjects were taken
from data obtained from School and College Ability Tests (S.C.A.T.) administered to students in October 1979. Scores for the eleventh grade subjects were obtained from S.C.A.T. tests administered in October 1978. Some subjects in the study did not participate in the testing and current achievement and reading data for these subjects could not be obtained. Data for these students were included in the analysis only where missing scores were not a part of the phenomena being studied.

Both the Iowa Achievement Test and the School and College Ability Test measure basic verbal and mathematical abilities of students and provide an estimate of a student's reading ability. These tests are therefore useful in making comparisons between subjects in these areas.

As a precaution for keeping student data confidential and to eliminate any possible personal influence from affecting the data analysis, all student data were recorded by numbers assigned to each subject and all comparisons were made by reference to this subject number.

Videocassette Recorder Selection and Modification

At the time of this study, no currently available video recorder on the market is capable of quality audio pitch control during variable speed playback operation. This type of option is available only in sophisticated and expensive editing equipment where the pitch controlled audio output is used as an aid to cue portions of the
In order to perform the research outlined in this study, the researcher selected a currently available VHS videocassette recorder, the Panasonic NV-8310, and modified the unit by incorporating a speech compression module into the audio output circuitry of the videocassette recorder. The speech compression module, model VSC-M8B, is produced by the VSC Corporation of San Francisco, California. This company currently produces and markets a line of variable speed audio recorders with speech compression, and EOM speech compression modules for other manufacturers.

The Panasonic NV-8310 videocassette recorder is equipped with both still frame and variable speed operation in the playback mode. Variable speed operation is continuously variable from still frame to 1.5 times the normal playing speed of 1 5/16 inches per second. Playback speed can then be increased to two times normal by engaging a switch which is incorporated in the speed control knob. In order to make the NV-8310 capable of audio compression and expansion, it was necessary to disable the recorder's audio muting circuitry which is normally functioning during variable speed playback, and connect the VSC speech module to the audio output circuitry. To provide a reference voltage for the operation of the speech compression board, the board was also connected to the playback drive motor circuit. Power to operate the VSC module was provided from
Plate I
Speech Compression Module Installed in Panasonic NV-8310 Videocassette Recorder
the power supply of the videocassette recorder. The VSC module was completely enclosed within the cabinet of the Panasonic Videocassette recorder, as shown in Plate 1, and control of the speech module was provided through the existing speed controls on the recorder. No additional controls were necessary. To accommodate the speech module to the videocassette recorder, minor circuit changes were made in the module, consisting mainly of changing resistances in various parts of the circuit.

Variable speed operation of the videocassette recorder is accomplished by first engaging the still frame/pause key on the keyboard of the recorder and then manipulating the speed control knob/switch on the front of the recorder's cabinet. Both control devices are pictured in Plate 2. With the speed control knob in the IN position, speed can be varied from still picture to 1.5 times normal speed. Audio pitch control begins operation when there is sufficient audio information present to produce a useable audio signal, about 0.6 times normal playback speed, and continues through the speed range of the recorder. Pulling the speed control knob out disengages the variable speed function and provides a two times normal playback speed. The speech compression module continues to provide compressed, pitch-corrected audio output at this speed. Releasing the still frame/pause key automatically returns the recorder to normal speed operation regardless of the
Plate II
Panasonic NV-8310 VHS Videocassette Recorder with Details of Still Frame Key and Variable Speed Control Knob
position of the speed control knob. All other control functions on the recorder are similar to those of other audio and video recorders currently being used in educational settings.

**Viewing Equipment**

The program tape was played back using the Panasonic NV-8310 videocassette recorder for both the comparison and rate varying subjects. The comparison groups viewed the test program on an RCA JA-970-W 25-inch color studio monitor. Due to the close proximity of the rate varying subjects to the television monitor, rate varying subjects viewed the test program on a Sony KV-1205 12-inch color television receiver. Comparison subjects listened to the audio portion of the test program through the speaker on the RCA monitor. Rate varying subjects listened to the audio portion of the test program through lightweight headphones. Headphones were used for the rate varying subjects to help isolate them from distracting sounds present in the viewing environment.

**Rate Varying Subjects' Video Tapes**

All rate varying subjects were videotaped during the program viewing period, with the exception of three subjects who could not be taped due to technical difficulties with the recording equipment. Subjects were taped using a fixed color camera and 1/2-inch Beta videocassette
These tapes were then analyzed to determine any difficulty the subject may have had manipulating the equipment, the subject's attendance to the viewing task, and the accuracy of the observer's recording of subject manipulation data. The subject's television monitor is also visible on the videotape and the audio output of the subject's videocassette recorder was patched into the observation recorder so that data concerning the rate of manipulation of the subject recorder could be obtained directly from the tape. Data from the examination of the subject observations and the observation tapes were compiled for detailed analysis of the viewing and program rate manipulation process.

**Orientation Procedure**

Each of the treatment and the comparison subjects was given an orientation to the equipment used in the study and training in the use of the videotape system. Each student was given only the training needed to complete the required task. Comparison students were taught only how to load and play back the taped program using standard playback procedures. Rate varying subjects were taught the use of the pause control level and the speed control knob and switch, as well as the standard load, playback, fast forward, and rewind operations of the videocassette recorder. Rate varying subjects were also shown the operation of the volume controls on the television and headphones.
Subject Treatment

The subject treatment consisted of each of the randomly selected students viewing a 5.75-minute long educational television program. All subjects were told the nature of the research and that they were helping to evaluate the effectiveness of the viewing procedure and the video equipment. The comparison subjects viewed the program in its entirety one time. Immediately following the viewing, the subjects were administered a post-test designed to test for comprehension of the program material. Following the post-test, each subject was individually interviewed concerning their viewing experience, the content and purpose of the program, and their opinions concerning televised instruction.

Rate varying subjects viewed the same 5.75-minute program, but each subject viewed the program privately. The viewing environment for the rate varying subjects was set up in an area of each school building isolated from the mainstream of school activity. Here, each student was allowed to view the program in whatever manner he or she pleased to use. Prior to the viewing of the test program, rate varying subjects were told the nature of the research, all recording equipment in the room was pointed out to them and its purpose explained, and they were shown how to operate the videocassette recorder, including the speed control system. Following this orientation and
explanation, the subjects were allowed to practice using the equipment for as long as they felt necessary until they were comfortable with the controls and function of the equipment. The subjects were then allowed to view the test program, varying the rate of presentation at will and skipping forward or backward within the program as much as they desired. Subjects were allowed to repeat the program as often as they wished, reviewing the material in whole or in part until they were satisfied that they had learned sufficiently from the material. Subjects were then administered the same post-test as the comparison group. After the post-test, rate varying subjects were given the same interview as the comparison group, with additional questions concerning their experience with and impressions of the process of rate manipulation and the equipment which they had used.

During the rate varying subject's viewing of the test program, the investigator made careful observations concerning the subject's attendance to the viewing task, the number and kinds of manipulation taking place, and the total viewing time.

**Treatment Program**

The program selected for use in the study was chosen from currently available educational television programming. The program selected was titled *Specific Nouns*, and is part of a series titled *Write-On* produced by the Ontario
Education Communications Authority. The program is designed to reenforce the use of specific rather than general nouns through a humorous dramatization of a news reporter's effort to produce a story concerning a news event. The program was evaluated for suitability as to grade level and content by a panel of three educators familiar with educational television programming. The word rate-per-minute of the dialogue for this program was 130.

The post-test was analyzed and validated by a review committee of educators familiar with the content of the program selected. The post-test was tested for validity and common knowledge in a pilot study utilizing students not associated with the schools taking part in the study. The post-test was then validated using an item analysis of each question.

Subject interviews were based upon an interview schedule approved by a panel of educators who examined the content and scope of the questions posed to the subjects. The interview placed the main concentration upon the subject's feelings concerning rate control of televised material, ease of operation of the equipment, subject's motivation to manipulate the program rate, distracting elements in the viewing process, and their views concerning the overall learning experience.
Statistical Treatment

The data resulting from this study were of a varied and diverse nature. Since the study was designed to be exploratory, much of the data collected was used to better define the factors in operation when the rate of television presentation is manipulated, and to derive from the data and observation analysis implications which should be further studied.

Analysis of post-test score means, using t-tests, was used to determine the effectiveness of the treatment in increasing comprehension of the subject material both between treatment and control groups, and within both groups by the various grade levels. The t-tests were also used to examine comprehension between the treatment and control groups and the various sub-groups identified in the data analysis.

Subject profile data were analyzed to determine the significance of sex, race, and age using Chi-square analysis techniques. Subject reading and achievement score means were also examined to determine if there was any significant correlation between these factors and subject performance, both in the total treatment and control groups and in the specific sub-groups.

Data compiled from subject interviews were examined to determine student response to the rate manipulation process, ease of operation of the equipment used, educational
television programming in general, and perceived problems with the compressed or expanded audio portion of the program material.

Manipulation data obtained from subject observation was used to define certain types of viewing behavior and to help identify groups of subjects who utilize the viewing process in similar ways. These data were also used to determine subject response to the viewing process and their attendance to the task, as well as those elements which might have distracted subjects from the viewing process.

Summary

Although this study was designed to explore the concept of television program rate manipulation, every effort was made to keep the data collected as meaningful as possible for this type of study. The random selection of subjects and their assignment to the various groupings was designed to ensure that the sample was a legitimate representation of the population. Subject orientation procedures were structured so as to give the subject every opportunity to become familiar with the equipment and the rate manipulation process. Both the post-test and the program were analyzed to ensure their suitability. The observation data collected during the actual study and in the later examination of the rate varying subjects' video tapes, combined with the subject profile data, provided a great deal of information with which to study the rate
manipulation process. Statistical tests using post-test scores and subject profile data were used to determine the degree to which the proposed hypotheses could be statistically supported.
CHAPTER IV

FINDINGS

The data collected in this study provided much information with which to examine the major and minor hypotheses, and the process of television program presentation rate manipulation by learners. When given the opportunity, the majority of the subjects did manipulate the rate of presentation, as was stated in major hypothesis number one. Major hypothesis two was also supported by the data obtained from subject observations, as all the subjects displayed a high attention to the viewing task and expressed a positive attitude toward the process.

There was no evidence, however, that either learning comprehension or retention were increased by allowing subjects to control the manipulation rate of the program, as was stated in major hypothesis three. There was strong evidence to support major hypothesis four, as manipulation behavior varied greatly between subjects.

There was no evidence to support minor hypotheses two and three concerning the relationship between rate of viewing and either achievement scores or reading levels,
but further study of these relationships, dealing directly with these factors might provide more insight into these areas.

Minor hypothesis number one was supported by observation data which indicated that those subjects who did manipulate presentation continued to manipulate the rate throughout the course of the program.

The design of the study included the use of a post-test with which learning comprehension and retention might be measured. In order to test for general knowledge and the suitability of the test to the subject of the treatment program, without the use of a pre-test which would prepare the treatment subjects for the television program, the post-test was administered to groups of students in non-treatment schools who did not view the program. These tests were then analyzed for suitability of question design and content and the scores from these pilot groups were then used to determine if treatment subjects had learned from the content of the television program. A comparison of mean post-test scores for pilot, comparison, and rate varying group totals and individual grade levels are presented in Table 1. A discussion of these scores is provided in the Post-test Scores section of this chapter.
### Table 1
Mean Post-test Scores of Pilot Groups, Comparison Groups, and Rate Varying Groups
By Grade Level and Total Subjects

<table>
<thead>
<tr>
<th>Group</th>
<th>Total (n)</th>
<th>Grade 4 (n)</th>
<th>Grade 8 (n)</th>
<th>Grade 11 (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot Group</td>
<td>24.2 (66)</td>
<td>21.3 (29)</td>
<td>27.6 (26)</td>
<td>23.6 (11)</td>
</tr>
<tr>
<td>Comparison Group</td>
<td>27.7 (32)</td>
<td>26.5 (12)</td>
<td>27.6 (9)</td>
<td>28.3 (12)</td>
</tr>
<tr>
<td>Rate Varying Group</td>
<td>25.8 (38)</td>
<td>25.1 (12)</td>
<td>26.4 (14)</td>
<td>25.8 (11)</td>
</tr>
</tbody>
</table>
Major Interest Areas

An analysis of the data collected in this study provides four major areas of interest as identified by the investigator. These areas concern the data generated by the post-test scores, the subject interviews and data profiles, the subject observation data, and the identification of four specific types of viewing activity in the treatment group. Due to the relevance of the identification of these four groups with respect to the other data obtained, the first phase of the data analysis will be the precise identification and definition of these groups of viewers.

The identification of the four groups is based upon the specific type of viewing behavior of the treatment subjects. Analysis of the observation data and tapes revealed that subjects viewed the test program in one of four ways. Some subjects simply watched the program through one time at normal speed, some subjects watched the program two or more times at normal speed, some subjects watched the program one time at normal speed and then reviewed all or part of the program at various speeds, and some subjects viewed the program only using various speeds, never at normal speed.

Normal Speed, One Time Only. This group, identified as Group A in Figure 2, consisted of nine subjects, including four eleventh grade students and five eighth grade students. No fourth grade students were in this group. The
Grouping of Rate Varying Subjects by Viewing Behavior

Figure 2
mean score on the post-test for this group was 23.3, the lowest of the four groups identified. An analysis of post-test scores, achievement scores and reading level scores comparing Group A with the other three identified groups, the total treatment group, the total control group, and the treatment and control groups and the three identified viewer groups at each grade level produced no evidence of significant difference between the various groups. Scores were compared using t-tests derived from raw score data. Chi-square analysis of the sexual and racial make-up of Group A also failed to reveal any significant difference due to these factors.

Analysis of the interview responses of Group A revealed that seven of the nine reported difficulty in understanding the audio portion of the program at speeds other than normal. Four of the group also reported having difficulty concentrating on the program at other than normal speeds. In all other responses, the Normal Speed Only group conformed with the majority of the subjects in a favorable analysis of the process and the general concept of televised instruction. Group A's attendance to the viewing task compared favorably with other treatment subjects, but an observation of these subjects reveals a general lack of enthusiasm for the process and the program not evident in the other three groups.
Average viewing time for this group was 5.5 minutes, the shortest viewing time of any of the identified viewing groups. This viewing time was actually less than the time of the test program because some subjects stopped the viewing before the credits were completed.

**Normal Speed, Multiple Viewings.** Group B, which consisted of six treatment subjects, two from each grade level, viewed the test program at normal speed completely through and then chose to review the program totally, or in part, again at the normal speed. Again, t-test analysis of test score means failed to identify any significant differences between this group and the other three groups, or this group and the total test group or comparison group, either as a whole, or by grade level. Post-test mean score for Group B was 27, the highest score of the four groups identified. Chi-square analysis of sexual and racial data for Group B also failed to produce any significant results. As in the previous group of treatment subjects, no significant difference was found in the reading level or achievement test scores for the Group B subjects. Viewing time for the Normal Speed, Multiple Viewings group average 10.9 minutes, approximately twice that of the one time normal viewing group.

Interview responses of Group B were similar to the one time normal viewing group. Four members of Group B reported difficulty concentrating on program material at
other than normal viewing speed, and two subjects reported
difficulty in understanding the compressed program audio
track. This group's attendance to task was very high and
student enthusiasm toward the project was considerably
greater than the One Time Normal viewing group.

The mean score for eleventh grade subjects in Group B
was 29.5, the highest mean score for eleventh grade sub-
jects reported in any of the groups.

Normal Speed, Variable Speed Scan and/or Review. The
viewing behavior of this group, identified as Group C in
Figure 2, varied from that of the previous two groups in
that after viewing the program at normal speed, these sub-
jects chose to either scan through the program again at
various speeds, usually 1.5 times normal, or they chose to
review the complete program at high speed. Subjects in
Group C again displayed a high level of attention to the
task of viewing, and expressed positive response to the
total viewing process.

Group C's mean score on the post-test was 26.9. The
t-test analysis of test scores for eighth grade students in
this group comparing their scores to the total eighth grade
treatment and comparison groups produced a rejection of the
null hypothesis of no difference between groups, $t (40) =
4.0099, p < .01$ between Group C and treatment group total,
$t (30) = 2.3243, p < .01$ between this group and the compar-
ison group total. All other comparisons of scores for
Group C failed to produce a rejection of the null hypothesis. Total subjects in this group was eight, four fourth grade subjects, three eighth grade, and one eleventh grade subject. Chi-square analysis of sex and race data again failed to produce any significant difference between Group C and the three other rate varying groups, or the treatment and comparison groups. No significant difference was found for reading level or achievement test scores for this group when t-tests were compared with those of the other identified groups or with total and grade level treatment and comparison groups.

Subjects in the Normal Speed, Variable Speed Scan and/or Review group expressed less difficulty with understanding the compressed speech audio track and only two of the group's members expressed difficulty in concentrating on the program at other than normal speeds.

Total viewing time for Group D averaged 11.4 minutes, the longest time for any of the groups. This longer viewing time was due in part to the time spent by the viewers attempting to locate specific parts of the program to review using the fast forward and rewind controls of the videocassette recorder. This system proved to be very inaccurate as a means of locating portions of the program and caused some confusion and frustration to subjects attempting to find specific parts of the program material. This difficulty was identified both during the actual
program manipulation and in the review of the subject video tapes.

**Varying Speed Only, No Normal Speed Viewing.** This final group was the largest group identified. The 15 treatment subjects in this group included six fourth grade subjects, four eighth grade subjects, and five eleventh grade subjects. The mean post-test score for this group was 26.3.

Tests for significance, using \( t \)-test analysis, between Group D and other groups and Group D and treatment and comparison groups, both total and grade level, failed to reject the null hypothesis of no significant difference between the groups. The \( t \)-test analysis of reading and achievement test scores between these same groups also failed to determine a significant difference between Group D and any of the other groups previously mentioned. Chi-square analysis of sex and racial data again failed to produce any evidence of significant difference between Group D and the other three groups identified, or between this group and treatment and comparison groups by group totals or by grade levels.

The Varying Speed Only, No Normal Speed Viewing group, although the largest in total number of subjects, contained the smallest number of subjects who expressed any difficulty either understanding the compressed audio track or concentrating upon the program at other than normal viewing speed. Only three subjects reported such difficulty, and
the post-test scores for these three subjects compared favorably with the mean scores for both the treatment and the comparison groups. Examination of interview data for this group shows a very positive response to the program, the concept of televised instruction, and the concept of compressed media. Subject attendance to task was again very high, and student interest in the study was most positive.

Average viewing time for Group D was 10.4 minutes. This longer time was due in part to the extremely long viewing times of four of the six fourth grade subjects. These times ranged from 14.3 minutes to 24.2 minutes and represented a significant increase over the viewing times of the other subjects in this group who averaged 7.6 minutes viewing time. Part of the increased viewing time for these fourth grade students can be attributed to the difficult fast forward and rewind process involved in locating specific parts of the program for review. The increase in viewing time for these students can also be attributed to the students' curiosity concerning the concept of compressed media and increased difficulty that fourth grade students had with the content of the test program, as is reflected in the mean score for the fourth grade treatment group, the lowest of the three grade levels.
The four groups identified here form four very definite patterns of television viewing. It is interesting to note that, given the opportunity to manipulate the rate of presentation of the television program, 15 subjects, making up 39% of the total rate varying group, chose to view the program at normal speed.

**Post-test Scores.** The post-test was administered to all treatment and comparison subjects in the study. In addition, the test was also administered to fourth, eighth, and eleventh grade students not involved in the actual study as a pilot test to determine the fitness and general knowledge content of the test instrument. The pilot test was administered to students without their having seen the program or in any way being informed of the content or nature of the actual study. A comparison of the mean scores of the pilot group, the rate varying group, and the comparison group using $t$-tests reveals clear evidence of learning from the program for both the rate varying and the comparison groups at the fourth grade level, $t (39) = 3.1519, p < .01$ for the comparison group, and $t (39) = 2.1845, p < .05$ for the treatment group, and for the comparison group at the eleventh grade level, $t (20) = 2.6039, p < .05$. Comparison of the eighth grade rate varying and comparison group post-test scores and the eleventh grade rate varying group post-test scores with the corresponding scores for the pilot groups produced no evidence of
significance, \( t (33) = .0584, \ p > .05 \) for the eighth grade comparison group, \( t (38) = .7864, \ p > .05 \) for the eighth grade rate varying group, and \( t (21) = .9828, \ p > .05 \) for the eleventh grade rate varying group. Eighth grade pilot subjects had received specific noun instruction prior to the administration of the post-test, in the course of their classroom instruction, which may account for the high scores of this group. All secondary subjects had been exposed to the content of the post-test during the course of their formal English education.

Mean scores for the post-test for all treatment subject groups were very similar, as is shown in Table 2. In each case, the post-test mean score for the comparison group was larger than the mean score for the rate varying group, although not significantly. Thus, the study fails to reject the null hypothesis of no significant difference for major hypothesis number three, which states that "subjects who are allowed to manipulate the rate of program presentation will exhibit greater learning comprehension and retention than will subjects without such control who view the same program at normal rate."

Further \( t \)-test analysis of test scores between the four viewing types identified earlier also failed to reject the null hypothesis of no significant difference between the groups, although the three groups which used some form of review or scanning of the program posted higher mean
Table 2
Mean Post-test Scores of Manipulation Groups, Rate Varying Groups, and Comparison Groups by Grade Level and Total Subjects

<table>
<thead>
<tr>
<th>Group</th>
<th>Total (n)</th>
<th>Grade 4 (n)</th>
<th>Grade 8 (n)</th>
<th>Grade 11 (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Speed, One Viewing</td>
<td>23.2 (9)</td>
<td>22.6 (5)</td>
<td>24.0 (4)</td>
<td></td>
</tr>
<tr>
<td>Normal Speed, Multiple Viewings</td>
<td>27.0 (6)</td>
<td>25.0 (2)</td>
<td>26.5 (2)</td>
<td>29.5 (2)</td>
</tr>
<tr>
<td>Normal Speed, Variable Speed</td>
<td>26.9 (8)</td>
<td>24.8 (4)</td>
<td>29.3 (3)</td>
<td>28.0 (1)</td>
</tr>
<tr>
<td>Speed Review/Scan</td>
<td>26.3 (15)</td>
<td>25.3 (6)</td>
<td>29.0 (4)</td>
<td>25.4 (5)</td>
</tr>
<tr>
<td>Variable Speed Only</td>
<td>25.8 (38)</td>
<td>25.1 (12)</td>
<td>26.4 (14)</td>
<td>25.8 (11)</td>
</tr>
<tr>
<td>Rate Varying Group Total</td>
<td>25.8 (38)</td>
<td>25.1 (12)</td>
<td>26.4 (14)</td>
<td>25.8 (11)</td>
</tr>
<tr>
<td>Comparison Group Total</td>
<td>27.7 (32)</td>
<td>26.5 (12)</td>
<td>27.6 (9)</td>
<td>28.3 (12)</td>
</tr>
</tbody>
</table>
scores than the Normal Speed, One Time Only group. The small sample size for the various groups limits the ability to make accurate predictions for significance.

**Subject Interviews and Data Profiles.** As stated earlier in the discussion of the four types of viewing behavior of the treatment subjects, Chi-square analysis of sex, age, and racial data taken from subject profiles failed to reveal any significant difference in subject grouping, achievement on the post-test, or student response to the manipulation or viewing tasks as a result of any of these characteristics. All subject groups reflected reasonably normal distributions with regard to sex, race, and age. The one exception to this trend was in the absence of fourth grade subjects in the Normal Speed, One Time Only treatment group. There is no indication from the data available concerning the reason or reasons for this lack of fourth grade subjects, but observation of the fourth grade subjects as a group seemed to indicate a greater curiosity with the manipulation process and its outcome, and a greater enthusiasm for the entire process than was exhibited by the other grade levels.

An examination of the four identified viewing behavior groups with regard to achievement scores and reading level revealed no significant difference in the rate of manipulation of the program with regard to these items, using _t_-tests of means generated from raw achievement and reading
scores as a method of comparing the groups. Therefore, minor hypothesis number two, which states that the rate at which the subject will view the presentation will vary directly with the measured intelligence of the subject as determined by Iowa Test achievement scores for fourth grade subjects, and School and College Ability Test (S.C.A.T.) achievement test scores for secondary school subjects, and minor hypothesis number three, which states that the rate at which the subject will view the presentation will vary directly with the measured reading level of the subject as measured by Iowa Test reading levels for fourth grade subjects, and S.C.A.T. reading scores for secondary school subjects, are not supported by the data obtained in the study.

Interview Data

Student responses to interview questions concerning the nature of the program viewed, and its content were extremely positive and where questions concerning the program were asked, very accurate. Data from this part of the subject interview schedule is presented in percentage form for both the rate varying and the comparison groups in Table 3. Comparison subjects displayed a slightly higher understanding of the purpose of the program, as measured by response to question two of the Program Analysis section which asks subjects to state what they felt they were supposed to learn from the program, but close examination
<table>
<thead>
<tr>
<th>Question</th>
<th>Positive</th>
<th>Neutral</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>What was the program about?</td>
<td>97 (97)</td>
<td>---</td>
<td>3 (3)</td>
</tr>
<tr>
<td>What were you supposed to learn from the program?</td>
<td>79 (97)</td>
<td>5 (0)</td>
<td>16 (3)</td>
</tr>
<tr>
<td>Was the program easy to understand?</td>
<td>87 (100)</td>
<td>13 (0)</td>
<td>---</td>
</tr>
<tr>
<td>Did you enjoy watching the program?</td>
<td>92 (85)</td>
<td>3 (6)</td>
<td>5 (9)</td>
</tr>
<tr>
<td>Do you feel that you learned about specific nouns from watching the program?</td>
<td>89 (88)</td>
<td>8 (3)</td>
<td>3 (9)</td>
</tr>
</tbody>
</table>

*Numbers in parentheses indicate comparison group responses, other numbers indicate treatment responses.*
of treatment subject responses seems to indicate that this seeming lack of understanding was a result of confusing the learning outcomes of the instruction with the research goals of the actual study.

Analysis of the General Data section of the Interview Schedule, presented in Table 4, indicates that both the comparison and the treatment groups at all grade levels were very positive in their evaluation of instructional television programming. This section also confirms the quality of both the television image and the quality and level of the audio portion of the program.

Table 5 presents percentage data for subject responses to the Manipulation section of the Subject Interview Schedule. Treatment subjects responses to these questions indicate that operation of the video equipment did not seem to be a problem, and that subjects seemed to enjoy being able to manipulate the speed of the program. Even those subjects who expressed difficulty in understanding the compressed audio track or difficulty in concentrating on the program at other than normal speeds for the most part reported that they enjoyed varying the speed of the program. It is also interesting to note that subject perception of the degree to which they manipulated the program correlated closely with the observed degree of manipulation as measured by the observer. This seems to indicate a conscious effort was involved in the subject's decisions
Table 4

Subject Response to General Data Interview Schedule Questions by Percentage

<table>
<thead>
<tr>
<th>Question</th>
<th>Positive</th>
<th>Neutral</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you enjoy learning from television programs?</td>
<td>95 (91)</td>
<td>5 (6)</td>
<td>0 (3)</td>
</tr>
<tr>
<td>Was the picture clear?</td>
<td>97 (91)</td>
<td>3 (6)</td>
<td>0 (3)</td>
</tr>
<tr>
<td>Easy to watch?</td>
<td>97 (97)</td>
<td>0 (3)</td>
<td>3 (0)</td>
</tr>
<tr>
<td>Was the sound clear?</td>
<td>89 (85)</td>
<td>11 (3)</td>
<td>0 (12)</td>
</tr>
<tr>
<td>Was the volume set comfortably?</td>
<td>97 (88)</td>
<td>0 (0)</td>
<td>3 (12)</td>
</tr>
<tr>
<td>Would you like to watch more instructional</td>
<td>95 (94)</td>
<td>5 (0)</td>
<td>0 (6)</td>
</tr>
<tr>
<td>television programs?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Numbers in parentheses indicate comparison group responses, other numbers indicate treatment responses.*
<table>
<thead>
<tr>
<th>Question</th>
<th>Positive</th>
<th>Neutral</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you have any difficulty operating the video tape recorder?</td>
<td>2.5</td>
<td>2.5</td>
<td>95</td>
</tr>
<tr>
<td>Did you have any difficulty understanding the voices at the different speeds?</td>
<td>39</td>
<td>8</td>
<td>53</td>
</tr>
<tr>
<td>Would you like to be able to vary the speed of any television program you might watch?</td>
<td>84</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td>Did you enjoy being able to vary the speed of the program?</td>
<td>94</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Did you have any difficulty concentrating on the program at speeds other than the normal playing speed?</td>
<td>39</td>
<td>6</td>
<td>55</td>
</tr>
</tbody>
</table>
concerning program manipulation, rather than a more random, less organized approach to the rate manipulation process which might have been expected, especially from the fourth grade subjects.

**Subject Observation Data.** Observation of the rate varying subjects, both at the time of the treatment manipulation and the later analysis of the video tapes, provided considerable data related to the manipulation process, subject attendance to the viewing task, and total viewing time. Much of this data was used to identify the four categorical groups of subjects based upon viewing behavior presented earlier.

All subjects maintained attendance to the viewing task throughout the viewing process. Eighty-nine percent of the treatment subjects paid full attention throughout the process, the other 11% were very attentive, but were seemingly less involved in the viewing process. Viewer distractions from the program, which were recorded for every subject action which seemed unrelated to the viewing process, numbered only 14 for all the treatment subjects combined. This was due in part to the isolated viewing area, but viewer attention to the program was still very strong even when potentially disturbing activity took place in the viewing area.
Subject data concerning the manipulation of the program revealed that 60% of the treatment subjects manipulated the program in some manner. This finding supports the first major hypothesis which states that when placed in a learning situation where they have the ability to manipulate the rate of presentation of a television program, learners will manipulate the rate of program presentation. The data also revealed that 70% of the subjects who manipulated the rate of the program did so continuously throughout the program, and that the other 30% of the subjects manipulated the rate of the program mainly during the middle portion of the program. This data supports minor hypothesis number one which states that those students who are allowed to vary the rate of program presentation will continue to vary the rate of the program through the viewing period.

The identification of the four viewing behavior groups, combined with the observation data for the treatment group which indicates a variety of manipulation rates and patterns among the treatment subjects, tends to support the assumption of major hypothesis number four which states that due to the fact that all subjects do not learn at the same rates, different subjects who are allowed to manipulate program presentation rate will choose different playback rates.
Although observations of the treatment subjects during the rate manipulation process tend to support the hypothesis that subjects who are allowed to manipulate the rate of program presentation will exhibit more motivation and attendance to task than will subjects who cannot manipulate presentation rate, there is not a sufficient amount of data available from this study to actively support it, especially in view of the comparison group mean test scores.

**Viewing Times**

Rate varying subjects differed greatly in the amount of time spent viewing the test program. Viewing times ranged from a minimum time of 4.0 minutes to a maximum time of 24.15 minutes. Average viewing time for all groups was 9.51 minutes, 3.76 minutes longer than the normal speed program time of 5.75 minutes.

Scatter diagrams were plotted to compare subject viewing times with post-test scores, achievement scores, and reading level scores. Analysis of the data presented in Figure 3 indicates that post-test scores for the three rate varying group grade levels were not related to the viewing time. Scores for all three grade levels were fairly evenly distributed about the mean viewing time.

The comparison of the rate varying subject's achievement test scores with viewing time, as shown in Figure 4, also appears to be evenly distributed about the mean
Comparison of Rate Varying Subjects' Post-test Scores with Program Viewing Time

Figure 3
Comparison of Rate Varying Subjects' Achievement Test Scores with Program Viewing Time

Figure 4
viewing time. This scatter diagram also provides a graphic representation of the distribution of achievement scores for the three grade levels.

Reading level scores for eighth and eleventh grade rate varying subjects are plotted against subject viewing times in Figure 5. Fourth grade reading levels were not plotted because they were reported as yearly levels rather than percentile levels and all subjects were reported as being at either the 4.1 level or the 3.2 level, making interpretation of the plotted values meaningless. Examination of the scatter diagram in Figure 5 reveals no correlation between the time spent viewing the test program and the reading level of the viewer.

Data from these scatter diagrams indicates that the rate varying subjects viewed the program at widely varying rates independent of their achievement level or reading level, and that viewing time was not directly related to the performance of the subject on the post-test. It is important to point out that the test program was very short, and that the subjects were under no pressure to complete the task of viewing the program in any specified time, therefore, the ability of the video equipment to compress the time of the program for the viewer was not necessarily part of the subject's motivation in viewing at the varied rates. It is in fact possible that subjects may have extended the viewing time of the program to increase
Comparison of 8th and 11th Grade Rate Varying Subjects' Reading Level Scores with Program Viewing Time

Figure 5
the time spent outside the normal classroom environment, or to extend the possibly entertaining activity of manipulating the program.

**Summary**

The analysis of post-test scores for all fourth grade subjects and eleventh grade comparison subjects verified that those subjects did learn through the experience of viewing the television program, and there is some evidence that this was also true for the other secondary treatment groups, although no significant differences between pilot and treatment scores was obtained. Post-test scores also failed to reveal any significant difference between the learning comprehension of the comparison groups and the rate varying groups, and several possible reasons for this lack of significance are identified, including the design of the post-test itself, the lack of experience of the rate varying subjects with the equipment and with listening to compressed or expanded speech.

There was, however, strong indication that subject attention and motivation were enhanced by the ability to manipulate presentation rate, as reflected in the differences in viewing behavior between the comparison and rate varying groups. Rate varying subjects interview data also revealed that 94% of this group enjoyed the opportunity to vary the program rate.
No significant difference was found which relates a student's achievement level or reading level to either the degree to which the subject varies the presentation rate, or the subject's performance on the post-test. Data obtained did reveal that different subjects choose to manipulate the television programs in many ways, indicating that the viewing process is closely related to the individual viewer and lending support to the concept of individualized control of program viewing.

No evidence was found to indicate that either sex or race are significant with respect to viewing ability or behavior.
CHAPTER V

SUMMARY AND IMPLICATIONS

The main goals of this study were to explore the possible values of compressed media in the learning process and to determine the relationships which exist between a learner's ability to control the rate of presentation of a television program and that learner's comprehension and retention of the subject matter presented in the program, level of motivation, and attendance to the learning task.

Through the observation of the subjects during the viewing process, it was determined that the ability to vary the rate of program presentation does increase the subject's attendance to the learning task and motivation to view the program, even if the subject chooses not to vary the rate. This might indicate that there is motivational value in providing the learner with greater input in and control over the learning process.

Subject observation and interview data also identified the need for training in the use of compressed media equipment over a longer training period so that subjects become familiar with the operation of the equipment and the
increased attention and concentration needed for the comprehension of compressed or expanded speech. These data also pointed out the need to experiment with different types of variable speed tape scanning systems to determine which might be most valuable to the learner.

Examination of post-test scores indicated that the subjects did learn from the television program, but there was no evidence to support hypothesis three, that rate manipulation ability improved either comprehension or retention of the material presented in the program. Neither did the examination of these scores reveal any significance with regard to the subject's sex, race, achievement level, or reading level.

**Treatment Summary**

The statistical analysis of post-test score means and student interview data indicate that comparison subjects, rather than treatment subjects benefited slightly more from the program, although not to any significant degree. Interestingly, those subject within the treatment group who viewed the program in the same form as the comparison group scored lower on the post-test than treatment subjects who manipulated the program in some way. This finding, although again not statistically significant, would tend to support major hypothesis number three which states that those subjects who are allowed to manipulate the rate of program presentation will exhibit greater learning
comprehension and retention than will subjects without such control who view the program at the normal rate. This discrepancy between treatment scores and comparison scores and between groups of subjects within the treatment group indicates a negative learning effect due to the treatment, the treatment setting, the treatment process, or some combination of these factors.

Within the treatment itself, factors which may have contributed to the post-test scores include the physical act of manipulating the equipment, the novelty effect of the manipulation process, and the word rate of the test program. Several subjects reported in the interview that they experienced difficulty concentrating on the program at other than normal speed. Many of these subjects therefore chose not to manipulate the test program at all, and viewed the program at normal speed. The brief orientation period was not designed to be a complete training program for the operation of the equipment and the skill development for listening to compressed speech. The newness of both the equipment manipulation process and the high and low speed listening activity may well have caused a sufficient added burden to the treatment subject to produce a reduction in the ability of the subject to learn from the program. Observation of several of the subjects who manipulated the recorder during the viewing process revealed that a great deal of thought and concentration was necessary to produce
the desired manipulation effect. This was especially true for subjects who attempted to locate a particular part of a program using the fast forward and rewind controls of the videocassette recorder.

It is also possible that some of the subjects were so engrossed in the operation of the equipment and the corresponding effect of rate manipulation on the program material that actual learning from the program was reduced.

The word rate of the program selected, 130 words per minute, represents a relatively high listening rate, even at normal viewing speed. Subjects who chose to increase the speed of the program to two times normal experienced a word presentation averaging 260 words per minute which is very near the maximum rate of 275 words per minute identified by Foulke (1969), Sewell (1974), and Woodcock and Clark (1974). For subjects not used to listening at these levels, the word rate increase may have been too high for effective comprehension. This possibility is reinforced by the fact that 46% of the speed change manipulations by subjects were slowing down of the program.

Although the viewing environment was foreign to the treatment subjects in relation to their normal classroom situation, all the viewing areas were familiar to the subjects as students of that particular school building. Data obtained from student interviews and observations suggest that subjects were not distracted from the viewing process.
by the viewing environment and that attendance to the viewing task was very high.

The possibility that the post-test instrument might have been inadequate to accurately test for comprehension remains, but the results do point out the negative influence of the treatment. More likely is the probability that a subject area less generally known than that of English grammar would have yielded more significant scores.

The identification of groups of treatment subjects who exhibit specific, definable viewing behavior when given the opportunity to manipulate program presentation rate is perhaps the most important result of this study. The identification of these viewing groups lends support to the concept of viewing television as a very individualized behavior which can be modified to suit the needs of the individual learner.

It is significant to point out that due to the very short length of the test program, motivation to manipulate the rate of presentation was almost entirely due to the desire of the subject to experiment with the process. Time was not a factor and review could easily be accomplished by a total review of the program in real time. It is therefore not surprising that many subjects who were experiencing difficulty with comprehension of the compressed or expanded audio track, or difficulty with the operation of
the equipment chose to revert to conventional viewing patterns, in real time.

The highest scores obtained for any of the identified treatment groups were obtained by the group which viewed the program at normal speed and then reviewed all or part of the program one or more times, again at normal speed. Very similar scores were obtained by the rate varying group which viewed the program first at normal speed and then reviewed using the variable speed feature. There is some indication from this behavior that it is of value to the learner to be able to have access to immediate review of program material, but further research in this area is necessary before any supportable statement can be made.

**Implications for Further Study**

An evaluation of both the results of this study and the basic design used for the study reveals many factors of importance in the development of further research into the concept of compressed/expanded media.

**Subject Orientation.** In order to adequately analyze the value of compressed media to the learner, future studies must include more thorough training and orientation periods for subjects in the operation of the rate manipulation equipment, and in the rate manipulation process itself. Subject familiarity with the process would help eliminate much of the confusion surrounding the variable speed viewing process which occurred in this study. In addition,
subjects should be given compressed speed listening training to familiarize them with the word rates and corresponding data flow increase which occurs as a result of compression of the audio track. Subjects should also be made familiar with the interpretation of expanded speech and the listening skills needed to understand this form of modified speech.

Compressing Media to Save Time. One of the most valuable applications for compressed media may be that of time saving. The short length of the program used in this study did not allow for an analysis of this function of compressed media. Of course, viewing time is most important to those persons who need to cover a large amount of material in a small amount of time, or who need to review long or complex processes quickly. This type of learning situation often occurs in technical or professional fields such as engineering and medicine. Motivation levels for these persons would be very high with respect to desire to compress viewing time. Therefore, a study of these subjects involving compressed media in a practical application should yield very positive performance results, provided subjects are well prepared in the use of the equipment and listening and viewing processes involved.

Selection of Test Programs. In order to successfully evaluate the degree to which comprehension of program material is increased or reduced by rate manipulation of
program material, the subject matter involved in the test program should not be familiar to the subjects. Lack of familiarity with the subject of the program should increase the probability of determining the significance of the treatment and should also increase subject motivation to review material.

Further study should be made into the effects of individualized instructional television viewing with opportunity for material review. There is some indication from treatment group data in this study that the ability to selectively review all or part of a program results in an increase in viewer comprehension of program material.

**Visual Program Cueing.** There is some evidence from the observation of treatment subjects in this study to indicate that a valuable asset to the viewing process would be the ability to rapidly scan through the visual material of the program in forward or reverse in order to locate a specific point in the material. As was demonstrated by treatment subjects in this study, locating a specific part of a program for review can be very difficult and time consuming. The ability to perform this type of program scan is currently available on some types of Beta format 1/2-inch videocassette recorders.

**Reading and Achievement Level.** Comparison of subject reading levels and achievement score data in this study did not yield any significant positive or negative correlation
between the scores and rate and type of manipulation. More detailed study of the relationship between these factors and viewing behavior, carried out in a study specifically designed to test for these relationships might reveal the existence of very definite relationships between a subject's viewing behavior, the rate of manipulation of program material, and the subject's reading and achievement scores. As in all cases, care must be taken to provide adequate subject training in compressed media interpretation before this study can be undertaken.

Conclusion

The ability to compress or expand televised programs through video playback circuitry is in its infancy. With more and more instructional programming being made available on video tape the need to examine this information will undoubtedly increase, as will the use of video programming in all phases of instruction, including professional, technical and home applications as well as the regular school setting. News services, shopping information, and information services including reference data are projected services which will become available through cable and possibly broadcast television systems. The ability to rapidly scan and review this wealth of available information through television program manipulation would be a valuable asset to any such information system.
This study was developed to select a video system capable of variable speed playback, modify that system with the addition of audio speech control equipment for the compression and expansion of the audio output of the video recorder during variable speed playback, and then place this modified equipment in a controlled, experimental educational situation for the purpose of exploring the educational potential of the concept of compressed media, and the functional capabilities needed for compressed media equipment. It is hoped that data from this study will provide a basis from which to further analyze the concept of compressed media, and the design of compressed media hardware.

From a technical standpoint, as society becomes more technologically complex, the quantity of data which needs to be considered in making successful planning decisions in research, finance, medicine, industry, and energy becomes ever larger. Efficient systems for the rapid assimilation of this body of data are becoming increasingly important.

In the field of education, the once rare appearance of a television recording system in a classroom or school has now become commonplace and the video recorder a standard teaching tool. With the availability of instructional television programming currently offered by public television networks and supplemented by state supported instructional television distribution services, even the
smallest school or school district has a wealth of televised media available for use by its students. As microprocessor technology becomes more and more incorporated into the design of instructional television hardware, costs of equipment will continue to decrease while the ability to manipulate the program material available will become more sophisticated. This will not only make individualized use of television programming more feasible, but it will also greatly increase the ability of the learner to selectively extract needed information from the growing body of information available.
APPENDIX A

SUBJECT INTERVIEW SCHEDULE

Subject # Grade _____

PROGRAM ANALYSIS:
1. What was the program about?
2. What were you supposed to learn from the program?
3. Was the program easy to understand?
4. Did you enjoy watching the program?
5. Do you feel that you learned about Specific Nouns from watching the program?

GENERAL DATA:
1. Do you enjoy learning from television programs?
2. Was the picture clear? Easy to watch?
3. Was the sound clear? Was the volume set comfortably?
4. Would you like to watch more instructional television programs?

MANIPULATION:
1. Did you have any difficulty operating the video tape recorder?
2. Did you have any difficulty understanding the voices at the different speeds?
   If yes, what kinds of difficulty?
3. Would you like to be able to vary the speed of any television program you might watch?
4. Did you enjoy being able to vary the speed of the program?
MANIPULATION (continued):
5. Would you say that you varied the speed of the program:
   QUITE A BIT    SOMEWHAT    A LITTLE BIT    NOT AT ALL
6. Did you have any difficulty concentrating on the program at speeds other than normal playing speed?

OBSERVATION ANALYSIS:
1. Viewing Time: ______min. and ______sec.
2. Attention to program (subject):
   (FULL)  1  2  3  4  5  6  7  8  9  10  11  12
3. Number of Manipulations:
   A. Speed Up:  1  2  3  4  5  6  7  8  9  10  11  12
   B. Slow Down:  1  2  3  4  5  6  7  8  9  10  11  12
   C. Still Frame:  1  2  3  4  5  6  7  8  9  10  11  12
4. Review (Backed up program):
   1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16
5. Distractions (Looked away from program):
   1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16
6. Manipulation activity took place mostly:
   AT BEGINNING    IN MIDDLE    AT END    CONTINUOUSLY
APPENDIX B

Subject #: ______________________________ Grade: __________

PART I
INSTRUCTIONS:
Rewrite each sentence in the space provided, replacing the non-specific nouns with nouns which are more specific.

1. The game started early that day.
   1a. _______________________________________________________

2. Someone told me that an airplane crashed.
   2a. _______________________________________________________

3. The woman looked at the report.
   3a. _______________________________________________________

4. The man made a bad mistake.
   4a. _______________________________________________________

5. The girl said she really would like a pet.
   5a. _______________________________________________________

PART II
INSTRUCTIONS:
List four (4) nouns which are more specific than the noun listed.

1. MAN ___________ ___________ ___________ ___________ ___________

2. ANIMAL ___________ ___________ ___________ ___________ ___________

3. CAR ___________ ___________ ___________ ___________ ___________

4. GIRL ___________ ___________ ___________ ___________ ___________

5. FOOD ___________ ___________ ___________ ___________ ___________

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