# VIEWER SELECTION OF VISUAL INFORMATION: AN INSTRUCTIONAL TELEVISION EXPERIMENT

THESIS FOR THE DEGREE OF M. A. MICHIGAN STATE UNIVERSITY

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#### ABSTRACT

#### VIEWER SELECTION OF VISUAL INFORMATION: AN INSTRUCTIONAL TELEVISION EXPERIMENT

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The instructional television director, whose primary responsibility it is to interpret the instructor's lesson and convey his message through the syntax of television production, may deter rather than enhance effective communication. The purpose of this study was to design and test an experimental television message which required the student to perform the role generally assumed by the television director.

#### Design

Treatment I, the experimental television treatment, consisted of <u>two</u> video channels and one audio channel. Each video channel displayed different visual material simultaneously. The left receiver carried the image of the instructor throughout the entire presentation. The right receiver conveyed the visuals which were used to supplement the instructor's message.

Treatment II, the conventional television treatment, consisted of one video channel and one audio channel. The single video channel presented both the image of the instructor and the graphic materials. The audio tracks for both treatments were identical.

Treatment III, the control group, received no televised instruction.

A questionnaire was designed to measure achievement and attitudes. Achievement or Information Accrual scores were obtained for each group based on a multiple choice test covering information contained in the television message.

Attitudes and evaluation of the television treatments were obtained from students in Treatment I and Treatment II who completed the second portion of the questionnaire. Students were asked to respond to questions concerning various aspects of the television treatments and were encouraged and permitted to explain their answers.

The third part of the questionnaire was completed only by the Treatment I group for the purpose of obtaining specific information of attitudes toward, and evaluation of, the experimental television treatment.

### Findings

1. Information Accrual scores for each treatment were computed. A mean score for each group was obtained and compared statistically with a one-way analysis of variance. Scores were significantly different at the .05 level of significance. A posteriori comparisons between pairs of means were computed. Both the conventional and experimental television treatments scored significantly higher than the control group. There was no significant difference in Information Accrual between the experimental television treatment and the conventional television treatment at the .05 level of confidence.

2. The general information portion of the questionnaire revealed favorable attitudes by both television groups. Less than half the students in the conventional television presentation compared with all students in the experimental treatment indicated having ample time to study the visuals.

3. Students reported having no difficulty in shifting their attention between the two television receivers. The system produced little or no confusion. There was little or no consistency in the amount of time students attended to each receiver. The experimental television treatment provided each student with the option of selecting the amount of time he viewed each receiver.

## VIEWER SELECTION OF VISUAL INFORMATION: AN INSTRUCTIONAL TELEVISION EXPERIMENT

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## A THESIS

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ii

#### TABLE OF CONTENTS

														Page
ACKNO	WLED	GEME	NTS	•	•	•	•	•	•	•	•	•	•	ii
LIST	OF T	ABLE	S	•	•	•	•	•	•	•	•	•	•	iv
LIST	OF A	PPEN	DICE	S	•	•	•	•	•	•	•	•	•	v
Chapt	er													
I.	INT	RODU	CTIO	N	•	•	•	•	•	•	•	•	•	l
		Res	earc	h Re	eview	Ν.	•	•	•	•	•	•	•	5
II.	MET	HODO	LOGY	•	•	•	•	•	•	•	•	•	•	10
		Gen Exp Tel Tel Exp Exp	eral erim evis erim erim Que	Res ion ion enta stic	Seard Mess Mess Al Po Al St onnat	ch De reatm sage sage opula ltuat ire	esigr nents Desi Deve ation	lgn elopn	nent		• • • •	• • • •	• • • •	10 10 13 14 15 17
III.	THE	FIN	DING	S	•	•	•	•	•	•	•	•	•	20
		Inf Eva Att	orma luat itud	tior ion es J	n Acc of T Cowar	rual reat	L. zment xperi	ment	al I	Preat	: ment		•	20 25 31
IV.	SUM FOR	MARY FUR	, CO THER	NCLU RES	JSION SEAR(	NS, A Ch	ND 3		ICATI	IONS •	•	•	•	38
BIBLI	OGRA	PHY	•	•	•	•	•	•	•	•	•	•	•	45
APPEN	DICE	S	•	•	•	•	•	•	•	•	•	•	•	48

.

## LIST OF TABLES

Table						Page
l.	Mean Scores for Three Treatments .	•	•	•	•	21
2.	Analysis of Variance Summary Table	•	•	•	•	22
3.	Results of the Tukey (a) Procedure Individual Pairs of Means	ÍC •		•	•	23

## LIST OF APPENDICES

Appendix						Pa	age
I.	The Television Message	•	•	•	•	•	49
II.	Instructions for Administering t Experiment and Questionnaire	the •	•	•	•	•	54
III.	The Questionnaire	•	•	•	•	•	57
IV.	Responses to the Questionnaire	•	•	•	•	•	67

#### CHAPTER I

#### INTRODUCTION

Television is enjoying widespread acclaim for its valuable and significant contributions to education. Its potential, however, has not nearly been reached.

Scientific research is capable of producing new techniques which may further increase the effectiveness of television as an instructional tool. Evaluation of current practices may serve as the basis for innovation in instructional television.

The television director of an instructional television presentation, for example, by virtue of his relationship to the instructor and the student, is in a position to make a number of erroneous judgments. The most obvious of these errors may occur as the television director decides how long to retain a particular visual on the television screen. If it is held too long, brighter students who work at faster speeds may become bored with the lack of visual variation. On the other hand, if the television director retains the visual for too short a period of time he runs the risk of confusing slower students by the rapid changes in pictorial composition. These changes may prohibit the student from having adequate time to study the visual.

The television director, whose primary responsibility it is to interpret the instructor's lesson and convey his message through the syntax of television production, may deter rather than enhance effective communication.

The role of the television director in this context is exemplified in a communications paradigm by Bruce H. Westley and Malcolm S. MacLean, Jr.<sup>1</sup> The model describes a general communication situation involving a sender (the television instructor), a gatekeeper (the television director), and a receiver (the student).

The gatekeeper, originally described by Lewin,<sup>2</sup> functions in two ways in a communication situation. First, he receives information from the sender concerning the codification of the message which he is to relay to the receiver. Second, he receives feedback from the receiver concerning specific communication requirements of the receiver.

Generally, the effectiveness of the gatekeeper is judged on his ability to serve the receiver. In face-toface communication feedback from the receiver to the gatekeeper is usually available. In television, which exemplifies a one-way flow of communication from source to

<sup>1</sup>Bruce H. Westley and Malcolm S. MacLean, Jr., "A Conceptual Model for Communications Research," <u>Journalism</u> <u>Guarterly</u>, Vol. 34 (Winter, 1957), pp. 31-38.

<sup>2</sup>Kurt Lewin, "Psychological Ecology," <u>Field Theory</u> <u>in Social Science</u>, ed. Dorwin Cartwright (New York: Harper and Bros., 1951).

receiver, the gatekeeper (director) normally has no means at his disposal for obtaining feedback upon which to base his decisions.

Existing systems of feedback from the student in the classroom to the television studio and control room seem inadequate to produce genuinely significant information for the television director.

Ideally, a system of feedback in television communication is required which will minimize the responsibility of the TV director as a gatekeeper and transfer the gatekeeper role to each student.

Observation of a television control room suggests a possible solution for providing each student with the opportunity to achieve his own communication requirements. During a television production the television director concentrates on two or more television monitors for the purpose of selecting the shot or visual which he has determined is best for the receiver to view at any particular time. Was it possible, in much the same way the television director selected between two or more television monitors of different visual material, that each student could perform a similar selective process? If two television receivers were provided for each classroom and each receiver carried different visual material, would the student be able to act as his own gatekeeper by directing his attention between the two receivers?

An instructional television system of this nature might provide some definite advantages for the student or viewer.

First, each student, acting as his own gatekeeper, could determine for himself which of two visual channels to view at any particular time and for what specific length of time. The student-gatekeeper would be permitted, for example, to alternate his attention between one television receiver which carried the image of the instructor and a second television receiver which carried only descriptive visuals (i.e., maps, charts, diagrams). The visuals on the second receiver could be retained until a subsequent visual was needed and cued by the instructor's message.

Second, each student, acting as his own gatekeeper, would be required to become more actively involved in the viewing process. Because of his new role as gatekeeper he could no longer remain passive in the viewing situation. His participation and involvement could characterize a higher level of interaction than previously considered possible for one-way systems of communication.

Third, each student could receive a maximum amount of non-verbal communication. In a conventional television format the introduction of a chart or graph or picture eliminates the image of the instructor from the television screen. In the proposed treatment which permits the student to act as gatekeeper, the image of the

instructor is always available to him in much the same way the student in a live classroom situation may always view the instructor. The presence of the image of the instructor provides the student with the potential of obtaining a maximum amount of communication through the instructor's use of non-verbal cues such as facial expressions and gestures.

The purpose of this study was to determine the effectiveness of an experimental instructional television treatment which required the student to perform the role of gatekeeper.

#### Research Review

Research describing multi-channel systems of communication for instructional television is relatively scarce.

Several studies, however, cite information which may have some relevance in describing the relationship of the various channels to the total communication process.

Hartman reports that cues of various channels may summate or interact with each other when redundant information is presented simultaneously in both print and audio channels. Cue summation of this nature tends to increase learning. When channels fail to interact, learning is decreased. According to Hartman, "Interference among information simultaneously presented by multiple channels

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may be expected when the information in the various channels is unrelated." $^3$ 

Miller has observed that cues which eminate from different modalities simultaneously may either facilitate or interfere with each other. Cues which elicit identical responses simultaneously in different channels should tend to summate while cues which elicit incompatible responses should tend to produce conflict and interference.<sup>4</sup>

Berlyne suggests that complexity is preferred by humans who have a tendency to fixate upon a part of their environment which is a relatively rich source of information in preference to one which is a relatively poor source of information.<sup>5</sup>

Krech and Crutchfield suggest that objects or events that are close together in time or space or resemble each other tend to be perceived as parts of a common structure.<sup>6</sup>

Arnheim suggests that the mind is incapable of taking in everything simultaneously. He concludes that the

<sup>3</sup>Frank R. Hartman, "Single and Multiple Channel Communication: A Review of Research and a Proposed Mcdel," <u>AV Communication Review</u>, Vol. 9 (November-December, 1961), pp. 235-57.

<sup>4</sup>Neal E. Miller, <u>et al.</u>, "Graphic Communication and the Crisis in Education," <u>AV Communication Review</u>, Vol. 5 (Winter, 1957), pp. 1-113.

<sup>5</sup>D. E. Berlyne, "The Influence of Complexity and Novelty in Visual Stimuli on Orienting Responses," <u>Journal</u> <u>of Experimental Psychology</u>, Vol. 55 (March, 1958), pp. 289-96.

<sup>6</sup>David Krech and Richard Crutchfield, "Perceiving the World," <u>The Process and Effects of Mass Communication</u>, ed. W. Schramm (Urbana, Illinois: 'University of Illinois Press, 1954), pp. 116-137.

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observer scans various areas of information in succession rather than simultaneously.<sup>7</sup>

Ely, Bowen, and Orlansky conclude that the act of discrimination takes time. Accordingly, the more difficult the discrimination, the longer the time. The efficiency of multi-channel systems may be reduced due to the amount of time required by the viewer to discriminate among information carried through several channels.<sup>8</sup>

Davis and Johnson describe the limitations of a conventional television presentation to provide ample time for students in the classroom to view television visuals. Their report indicates that the television camera would often remove scientific formulae before students could copy them down.<sup>9</sup>

The significance of eye contact between the instructor on the television screen and the student in the classroom appears in several studies.

Tyler reports that disembodied voice is far less effective for inducing learning than the studio teacher

<sup>7</sup>Rudolf Arnhiem, <u>Art and Visual Perception</u> (Berkeley, California: University of California Press, 1954).

<sup>8</sup>Jerome H. Ely, Hugh M. Bowen, and Jesse Orlansky, "Man Machine Dynamics," <u>Joint Services Human Engineering</u> <u>Guide to Equipment Design</u> (Wright-Patterson Air Force Ease, Ohio: Wright Air Development Center, 1957), Chapter 7.

<sup>9</sup>Robert H. Davis and F. Craig Johnson, <u>Final Report:</u> <u>Evaluation of Regular Classroom Lectures Distributed by</u> <u>COFV to Campus and Dormitory Classrooms. Project Report</u> <u>Number 202</u> (East Lansing, Michigan: Michigan State University Educational Development Program, 1966). who teaches to the camera. This is perceived by each student in the classroom as though the teacher were speaking directly to him.<sup>10</sup>

Guba, et al., report a clustering of eye movements toward certain areas of a visual field. The most definite tendency is for the student to focus on the narrator's face when the narrator is present, often to the virtual exclusion of other elements within the visual field.<sup>11</sup>

Becker suggests that shots of the teacher tended to be accompanied by high Galvanic Skin Responses in the viewer. Becker concludes that if shots of a live performer attract attention, or even simply increase tension, this may contribute to increased learning.<sup>12</sup>

Williams and Sundene report that audiences employ certain dimensions of recognition in the perception of messages encoded in the "language" of facial expressions. These messages seem to convey information regarding an emotional state which is also manifested in the oral code.<sup>13</sup>

10I. Keith Tyler, "Educational Implications of the TV Medium," <u>AV Communication Review</u>, Vol. 12 (Spring, 1964), pp. 61-74

<sup>11</sup>Egon Guba, <u>et al</u>., "Eye Movements and TV Viewing in Children," <u>AV Communication Review</u>, Vol. 12 (Winter, 1964), pp. 386-401.

<sup>12</sup>Samuel L. Becker, "Interest, Tension, and Retention," <u>AV Communication Review</u>, Vol. 12 (Fall, 1964), pp. 277-91.

<sup>13</sup>Frederick Williams and Barbara Sundene, "Dimensions of Recognition: Visual vs. Vocal Expression of Emotion," AV Communication Review, Vol. 13 (Spring, 1965), pp. 44-52.

Miller considers a "response" as a fundamental factor underlying the learning process. A response by the student is participation or interaction which tends to increase learning.<sup>14</sup>

The studies cited, although insufficient for developing a sound theoretical base for multiple channel systems of communication, provide a valuable analysis of factors which influence the communication process.

<sup>14</sup>Neal E. Miller, "Principles of Learning by Televised Instruction," <u>College Teaching by Television</u>, ed. J. C. Adams, C. R. Carpenter, and D. R. Smith (Washington, D. C.: American Council on Education, 1958), pp. 27-42.

#### CHAPTER II

#### METHODOLOGY

#### General Research Design

The research reported in this study was exploratory. No formal hypotheses were formulated.

The problem was to obtain data concerning the relative effectiveness of an experimental instructional television treatment in two areas of particular interest.

First, a measurement of learning or educational achievement was required by which students who received the experimental treatment could be compared with students who received a more conventional television presentation.

Second, a means of obtaining qualitative information of student attitude and evaluation of the experimental television treatment was required.

#### Experimental Treatments

The experimental research design utilized three treatment conditions.

Treatment I, the experimental television condition, consisted of <u>two</u> video channels and one audio channel. Each video channel projected different visual material simultaneously on two television receivers. The left

video channel or television receiver carried the image of the instructor throughout the entire presentation. The right video channel or television receiver carried the visuals which were used to supplement the instructional presentation. This included graphic materials such as maps, diagrams, and printed words. The visuals in the right video channel were changed as dictated by the verbal content of the instructor's presentation.

Treatment II utilized a conventional television treatment consisting of one video channel or television receiver and one audio channel. The single video channel presented both the image of the instructor and the graphic materials used to supplement the instructor's presentation. The conventional television format alternated shots of the instructor with shots of the visuals. The audio tracks for both Treatment I and Treatment II were identical.

In Treatment III, the control condition, students received no instruction.

#### Television Message Design

It was necessary to develop a television message upon which a test could be constructed to judge the effectiveness of the television treatments in terms of student achievement.

Accordingly, a message for that purpose was designed based on the following criteria. First, the content of the message should contain information which

would be unfamiliar to the experimental population. This would insure that the scores on the test instrument were the result of information contained in the television treatment rather than of prior exposure to the material. Second, the content of the message should lend itself to a highly visualized television presentation.

A topic was selected from studies in Geology which provide recent evidence in support of the early theories of Continental Drift.<sup>1</sup>

Investigation into the content of introductory Geology courses at Michigan State University revealed that students are rarely exposed in depth to the theories of Continental Drift. Thus, the first requirement had been met. Secondly, it became obvious that the subject would easily lend itself to the integration of graphic materials such as maps, diagrams, and printed words.

A twelve minute instructional presentation revealing three popular theories of Continental Drift was prepared (Appendix I). The script was not designed to be read verbatim by the instructor but was developed to serve as a guide to the material to be covered and the order in

<sup>1</sup>Arthur Claude Munyan (ed.), <u>Polar Wandering and</u> <u>Continental Drift</u> (Tulsa, Oklahoma: Society of Economic Paleontologists and Mineralogists, 1963). S. K. Runcorn (ed.), <u>Continental Drift</u> (New York, New York: Academic Press, 1962). J. Tuzo Wilson, "Continental Drift," <u>Scientific</u> <u>American</u>, Vol. 208 (April, 1963), pp. 86-100.

which the graphic materials should appear. The instructor, a doctoral student in Geography, was asked to learn the content of the script and adapt the material to his own particular vocabulary, speech habits, style, delivery and gestural mannerisms.

#### Television Message Development

Three distribution channels of Closed Circuit Television (Michigan State University) were required to convey both television treatments simultaneously. Treatment I utilized two distribution channels for its two visual sources and Treatment II required one distribution channel.

The treatments were pre-recorded on videotape for playback during the actual experiment.

Videotape A contained the image of the instructor and the audio message. A single medium shot of the instructor was maintained throughout the entire twelve minute presentation.

Videotape B contained the graphics which were used in one of the two visual channels in Treatment I. Correct placement of the visuals and synchronization of visual changes on Videotape B were controlled by the television director who replayed Videotape A which contained the instructor's verbal message. Videotape A was used as a guide to insure the proper placement of visuals on Videotape B. Visuals on Videotape B were retained until the next visual was cued by the instructor's verbal

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message. Videotape A and Videotape B were used for the left receiver and right receiver respectively in Treatment I. Audio emanated from Videotape A only.

Videotape C was used for Treatment II. It contained shots of the graphics from the studio which were combined and alternated with the image of the instructor which was dubbed from the playback of Videotape A. The audio was also dubbed from Videotape A to Videotape C. Shots of the visuals were introduced as the instructor cued them in his verbal message and the image of the instructor reappeared following the instructor's initial comments concerning a particular phenomenon associated with the visual.

By utilizing this procedure a maximum amount of control between the two television treatments was achieved. The audio tracks of the instructor's message, the instructor's facial expressions and gestures, the shots of the visuals, and the shot of the instructor were identical in both treatments.

#### Experimental Population

Sixty-three students enrolled in an introductory broadcasting course in the Department of Television and Radio at Michigan State University served as the experimental population for the study.

The course, Foundations of Broadcasting, is the first course required for students in the broadcasting

curriculum. Enrollment consists primarily of students majoring in Television and Radio although a small number of students from other academic majors elect the course. Foundations of Broadcasting meets three times each week. The entire group meets with the instructor in a lecture situation for one hour sessions on Monday and Wednesday. An additional hour on Friday is used for students to meet in smaller discussion sections with a graduate teaching assistant assigned to each group.

Prior to the first meeting of the discussion sections during the second week of the term the students were randomly selected from the population and randomly assigned to one of three discussion sections. Students were assigned initially to those rooms in which the treatments for this experiment were to be administered during the third week of the term.

#### Experimental Situation

Prior to the regularly scheduled discussion period on Friday, an employee of Closed Circuit Television prepared the television treatment classrooms for the experiment.

For Treatment I, the experimental television treat-Iment, two television receivers were placed two feet apart at the front of the classroom. The left receiver which carried the image of the instructor was tuned to Channel 7 Of the closed circuit distribution system. The right

receiver which carried the visuals or graphics was tuned to Channel 5. Audio for Treatment I emanated only from the left receiver. The volume control on the right receiver was turned off.

For Treatment II, the conventional television treatment, two receivers were also placed at the front of the classroom to duplicate the physical conditions of Treatment I. Two receivers were placed two feet apart. Both were tuned to Channel 2 which carried the conventional television treatment.

Television receivers were not used nor required for the control treatment, Treatment III, which received no instruction.

Three graduate teaching assistants regularly assigned to the discussion sections were used to administer the experiment. Prior to the class period the graduate assistants checked for proper placement and tuning of the television receivers.

The television presentations were scheduled to begin five minutes after the start of the class period. The graduate assistants who administered Treatment I and Treatment II read introductory statements to their studernts (Appendix II). The statement served to inform the students of the nature of the experiment. Students were told that the experiment was being conducted by the Department of Television and Radio for the purpose of obtaining data concerning educational television.

Students were also informed that following the televised presentation they would be tested on information covered in the presentation.

The graduate assistant who administered Treatment III read a modified version of the statement which explained the project briefly and immediately introduced the test instrument.

All three videotapes were replayed simultaneously. Particular care was taken to insure synchronization between Videotape A and Videotape B of the experimental treatment.

Following the television presentations the graduate assistants administering Treatment I and Treatment II read a set of instructions regarding the test instrument which the students were to complete.

#### The Questionnaire

A questionnaire was designed and administered for the purpose of obtaining data which would compare the effectiveness of the experimental television treatment to the conventional television treatment and the control treatment. The questionnaire consisted of three parts.

First, to determine the effectiveness of the experimental television treatment on student achievement, a test, based on the factual information conveyed through the television message, was administered to each group of students. The test, termed Information Accrual,

consisted of fifteen multiple-choice questions. The questions were drawn from both audio and visual material contained in the television message. (Appendix III)

An Information Accrual score for each student was obtained based on the student's total number of correct responses to the fifteen item test.

Second, to compare the experimental television treatment to the conventional television treatment, a written interview, consisting of twelve qualitative statements, was administered to both television treatment groups. Students responded to each statement by answering the question with a "yes" or "no" answer. Students were permitted and encouraged to explain each answer. The written interview was used to obtain general information concerning student attitudes toward, and evaluation of, their respective television treatments.

Third, to obtain additional data concerning the experimental television treatment, a written interview, following the format of the evaluation portion of the questionnaire, was administered only to the group who viewed the experimental television treatment. The purpose of the eight qualitative questions in this section was to obtain specific attitudes of the students toward the experimental television treatment. The students were to evaluate several aspects of the experimental treatment.

Thus, all three sections of the questionnaire were administered to students in Treatment I. The first and second section, were completed by students in Treatment II. Only the first section, Information Accrual, was administered to the control group, Treatment III.

#### CHAPTER III

#### FINDINGS

An exploratory study was conducted to determine the relative effectiveness of an experimental television treatment which utilized two visual channels or television receivers to project different visual information simultaneously.

Data were obtained which described the effectiveness of the experimental treatment in terms of Information Accrual or achievement, general attitudes, and attitudes of students toward the experimental television treatment.

#### Information Accrual

Mean scores were computed for three treatment groups based on data collected from the Information Accrual test. Individual scores were determined by the total number of correct student responses on a fifteen question multiple-choice test.

Students in Treatment I who viewed the experimental television treatment achieved the highest mean score of the three groups. A mean score of 9.76 on the Information Accrual test was computed for twenty-one students.

Twenty-one students who viewed Treatment II, the conventional television treatment, achieved a mean score of 9.66 on the achievement test.

Students in Treatment III, the control group, received no instruction. The mean score for twenty-one students was 4.90 (Table 1).

TABLE 1--Mean scores for three treatments.

	Treatment	Mean Score
I.	Experimental TV	9.76
II.	Conventional TV	9.66
III.	No TV (Control)	4.90

A one-way analysis of variance was applied to the treatment means to determine if differences among the scores of the three groups signified genuine population differences rather than merely chance variations due to the randomization of samples within the same population.

The data were presumed to have met the statistical assumptions underlying the one-way analysis of variance.<sup>1</sup> First, the samples were randomly selected from a population which appeared relatively independently drawn and

<sup>1</sup>B. J. Winer, <u>Statistical Principles in Experimental</u> <u>Design</u> (New York, New York: McGraw-Hill Book Co., 1962). normally distributed. Second, the test scores were assumed to represent interval data.

Results of the one-way analysis of variance for equal sample size (n = 21) is reported in Table 2. The statistic produces a value of F = 24.1 which was significant at the .05 level of confidence.

Source of Variation	SS	df	MS	F
Between	323.9	2	161.9	24.1
Within	402.3	60	6.7	
Total	726.2	62		

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TABLE 2--Analysis of variance summary table.

\*F > 3.15 at .05 level of significance.

Thus, the analysis of variance statistic implied that differences among the mean scores of the groups were significant differences rather than chance variations.

A posteriori statistical comparisons were required to identify those individual pairs of treatment means which differed significantly.

The conservative Tukey (a) procedure was selected to compare the three pairs of mean scores individually. The Tukey (a) procedure was used because of its ability to reduce Type I error by requiring larger differences between pairs of means to obtain statistical significance. When individual comparisons of this nature are made which do not employ such conservative procedures, the level of significance increases with each additional comparison. The Tukey (a) procedure maintains a level of significance at alpha (.05) for all comparisons.

To achieve statistical significance with the Tukey (a), a score which exceeded the critical value was required. The critical value was computed at the .05 level of significance at 1.90.

Of the three pairs of mean scores analyzed with the Tukey (a) procedure, significance at the .05 level was obtained in two of three comparisons (Table 3).

TABLE 3--Results of the Tukey (a) procedure for individual pairs of means.

Individual Comparisons	Value
Experimental TV - Control	4.86*
Conventional TV - Control	4.76*
Experimental TV - Conventional TV	0.10 NSD

\*Critical value > 1.90

Treatment I, the experimental television treatment, achieved a significantly higher mean score than Treatment III, the control treatment, at the .05 level of significance. Treatment II, the conventional television treatment, also achieved a mean score which was significantly higher than that achieved by the control treatment, Treatment III.

The Tukey (a) procedure failed to reveal significant differences in Information Accrual scores at the .05 level of confidence between Treatment I, the experimental television treatment, and Treatment II, the conventional television treatment.

#### Discussion

The results of the one-way analysis of variance revealed a significant difference in Information Accrual scores at the .05 level of confidence. The Tukey (a) procedure indicated significant differences in Information Accrual at the .05 level between the experimental television treatment, Treatment I, and Treatment III, the control treatment, and between the conventional television treatment, Treatment II, and Treatment III, the control treatment, Treatment II, and Treatment III, the control treatment.

It may be concluded, therefore, that the differences in Information Accrual scores or achievement were directly influenced by the television message. Both television treatments achieved significantly higher test score means than the control treatment which received no instruction.

Failure of the Tukey (a) procedure to indicate a significant difference in Information Accrual between the experimental television treatment and the conventional

television treatment suggested that the experimental treatment may have provided little additional advantage for students in terms of achievement. Rather, results on the Information Accrual test indicated that both treatments were equally effective in their ability to induce student achievement.

## Evaluation of Treatments

In the general information portion of the questionnaire students were asked to evaluate their respective television treatments (experimental or conventional) by responding to twelve qualitative questions. The responses provided data concerning the students and their evaluation of certain elements common to both television treatments. The general information questionnaire considered four main areas of interest. (Appendix IV)

First, students were asked to provide information concerning their previous exposure to the subject matter of the television message, their prior involvement with instructional television courses at the college level, and their impression of the Information Accrual test.

The majority of students among both treatment groups indicated that they had had no previous exposure to the subject matter of the television message. A few students, however, reported that they had received superficial information related to Continental Drift in an introductory course in Geology at Michigan State University. The
information apparently provided no particular advantage for those students.

With only minor exceptions, most students reported having some prior experience with instructional television courses at the college level. More than half of the students indicated they had been enrolled in more than one televised college course.

The majority of students within each treatment group indicated that the Information Accrual test seemed representative of information conveyed through the television presentation. A few students, however, suggested that several of the questions may have been too specific.

Second, students were asked to rate the instructor in terms of his ability to communicate effectively and his ability to maintain student interest.

Both groups of students projected generally favorable attitudes toward the television instructor. Many of the students indicated that the instructor effectively explained scientific phenomena to an audience which had limited experience in the natural sciences. Although a number of students had no particular interest in the subject matter, the majority of the students indicated that the instructor was interesting to listen to and watch. A few students, however, reported that the instructor may have delivered some of his material too rapidly.

Third, several questions required students to rate their respective television treatments in terms of the relative quality of the presentation, the amount of confusion, if any, which resulted from the presentation, and the ability of the presentation to maintain their interest.

Fewer than half of the students who viewed the conventional television treatment indicated that the presentation was "better" than most educational television to which they had previously been exposed. The majority of these students attributed their rating to the increased number and frequency of visuals which were incorporated into the presentation.

Considerably more than half of the students who viewed the experimental television treatment rated it "better" than most other college level instructional television presentations which they had previously seen. The majority of these students attributed their rating to the treatment itself which utilized two television receivers to project different visual material simultaneously.

Less than half of the total number of students indicated that their respective treatments were confusing to watch. Those students who viewed the conventional television treatment suggested a variety of reasons for their confusion. The most frequently attributed cause of confusion was the speed at which the instructor presented

his material. The subject matter itself accounted for some of the confusion among several students.

Of those students who experienced some confusion while viewing the experimental television treatment, most attributed the cause of their confusion to the use of the two television receivers in the experimental treatment. Apparently, these students experienced some confusion or interference while shifting their attention between the two receivers. The students had difficulty in concentrating on the audio message while selecting between two sources of visual information.

On the other hand, an equal number of students indicated that the use of two television receivers to convey information minimized confusion. Some students reported little or no confusion because they spent the majority of their time viewing the receiver which projected the visuals or graphics.

Students responded favorably toward their respective treatment in terms of its ability to maintain their interest. The majority of the students found the presentations interesting due to the subject matter and the manner in which the instructor presented his material. Only one respondent in the experimental television treatment attributed his interest toward the presentation to the use of the additional visual channel.

Fourth, a number of questions were included to obtain specific information concerning the effectiveness of the visuals or graphic materials.

Both groups of students agreed unanimously that the visuals helped to clarify the televised presentation. Likewise, students agreed that their respective treatments would have been far less effective and interesting without the visuals.

Most students rated the clarity of the visuals as highly communicative. There were some indications from both groups that although the visuals were clear, they were not particularly interesting. Students from both groups commented that the simple line drawings used for maps and diagrams lacked imagination.

Both groups of students were asked if they were provided ample time to study the graphics presented by their respective television presentation. Less than half of the students who viewed the conventional television treatment indicated they had ample time to study the visuals while <u>each student who viewed the experimental</u> <u>television presentation indicated having enough time to</u> study the visuals.

### Discussion

The data obtained from the general information portion of the questionnaire provided a method for comparing the attitudes of students in the experimental television treatment to the attitudes of students in the conventional television presentation.

Certain similarities among the students of both treatment groups were observed. Students appeared to

have been generally matched between the two groups in terms of their prior exposure to instructional television at the college level, their exposure to the subject matter of the television message, and their evaluation of the Information Accrual test.

Likewise, both groups of students projected generally favorable attitudes toward the television instructor and his ability to communicate effectively.

The most obvious difference between the two television treatments was that the experimental television treatment provided ample time for each student to study the visuals or graphics. More pronounced differences might have occurred if the visuals had been more complicated. The simple line drawings were extremely easy to perceive by both groups of students. Visuals of greater complexity and detail might have reduced the number of students in the conventional treatment who indicated having ample time to study the visuals.

Since most students indicated they had had some prior exposure to instructional television at the college level it was assumed that this previous experience was used by students as the basis for evaluating the effectiveness of the presentations. The fact that almost half of the students who viewed the conventional television treatment stated that the presentation was "better" than most educational television may indicate that the

conventional television treatment used in this study was not representative of a typical or average instructional television lesson.

If, in fact, the conventional television treatment was not typical of an average instructional television presentation, more favorable attitudes and higher achievement scores may have been erroneously obtained from the group than a truly average presentation would have produced.

#### Attitudes Toward the Experimental Treatment

The statements in the third portion of the questionnaire, completed only by those students who were exposed to the experimental television treatment, were designed to project specific information concerning student attitudes toward, and evaluation of, the experimental treatment. A number of questions were employed to describe the relationship of the student to the experimental television treatment.

First, the majority of the students in the sample reported experiencing little or no confusion from viewing two television receivers. Several students indicated that the two receivers complemented each other sufficiently to project a single idea. Another student indicated that confusion was minimized due to the simplicity of the receiver which projected the image of the instructor. According to the student, there was little need to watch this receiver since it provided no visual variation.

A relatively small number of students indicated experiencing some confusion as the result of watching the two television receivers. The confusion was attributed to interference which occured while the student shifted his attention between the two visual sources while at the same time arterpting to listen to the audio portion of the presentation. One student indicated that certain mannerisms and gestures of the instructor seemed to distract his attention while another student suggested that a splitscreen format would have provided the student with the same advantage as the two television receivers.

A second question asked if the student was able to direct his attention between the two television receivers without difficulty. There was almost unanimous agreement among students that selecting a visual channel to view was a relatively simple task. Students, for the most part, required little time to discriminate between the two receivers and select the one which was appropriate to them. According to one student, the receivers were positioned at a distance which permitted him to shift his attention between the receivers easily.

A third question asked students to estimate the percent of time they spent viewing each television receiver. There was an extremely wide range of estimates. Four students claimed to have viewed the instructor eighty percent of the time and the visuals twenty percent. At the other end of the scale, two students

indicated viewing the instructor around ten percent of the time and the visuals around ninety percent. The remaining estimates were scattered within this range.

The fourth question asked if the receivers were placed too far apart. The majority of the students indicated that the receivers were placed at an optimum distance from each other for viewing a presentation of this nature. One student suggested that if the receivers had been placed closer together there might have been a tendency to shift continually between them. On the other hand, two students indicated that the transition from one receiver to the other would have been less distracting if the receivers had touched each other.

The final question in the series asked if students thought the two receivers were more interesting to watch than one. The majority of students reported that the two receivers provided greater interest than a more conventional television presentation. Many students reported that the two receivers provided an alternative to them in their viewing. One student suggested that he was able to view the presentation in its entirety "without having to look out the window."

Thus, the use of the two receivers provided a constructive alternative for the student. He was not required to view a single screen continuously but could select between two related visual sources. Another student observed that the presentation was more

interesting because it permitted visuals to be retained on the screen for longer periods of time. One student suggested that the visuals were easier to see while another attributed the interest of the television treatment merely to "variety."

A relatively small number of students indicated that two receivers were less interesting to view than one. Their feeling was that the presentation could have been just as interesting if presented on a single screen.

The majority of the students in the sample indicated they liked the television presentation. A few students attributed their favorable attitudes to the addition of the second receiver. The majority of students who indicated negative attitudes toward the television presentation attributed their dislike to the subject matter of the television message.

Two questions were included to permit students the maximum opportunity to respond concerning the television treatment. One question asked students to indicate any favorable comments they had concerning the experimental television treatment. A variety of responses were obtained which indicated a great deal of enthusiasm for the experimental treatment.

A second question asked students to indicate criticisms they had concerning the use of two television receivers in the presentation which they had just viewed.

There was some agreement that the two receivers were distracting and might have caused some interference. The remaining responses provided little additional information than had been obtained by the previous questions.

#### Discussion

The data obtained from the third portion of the questionnaire revealed generally favorable attitudes of the students toward the experimental television treatment. The majority of the students reported that the experimental treatment was more interesting than most instructional television to which they had previously been exposed.

The data collected from several questions in this portion of the questionnaire indicated that confusion which may have resulted from shifting visual attention between the two television receivers was perhaps minimized due to the simplicity of the left receiver which projected the single medium shot of the instructor. Students, therefore, were able to attend to the right receiver for an indefinite amount of time with the security that the image of the instructor would remain constant on the left receiver. A more visually complicated or varied presentation would probably have yielded greater confusion and significantly different results in terms of Information Accrual and attitudes since the task of visual selection between television receivers would be more complex.

Several students suggested that the use of a single television screen which utilized a split-screen would have produced similar results by permitting the student to view two different visual elements. Although the split-screen would have duplicated the experimental treatment in this respect, the experimental treatment provided for easier viewing at greater distances from the receiver. The use of the split-screen should not, however, be overlooked for its ability to provide students with flexibility in their viewing.

The experimental television treatment required students to direct their attention between two television receivers. This suggested that the student was more actively involved in the viewing situation. This added participation may be characterized as a form of interaction between the student and the instructor. The student, by selecting between the two receivers, was involved in the learning process rather than being merely an observer of a single television screen. The fact that students experienced little confusion in adjusting to the experimental television treatment suggested that a *system* of this nature may be expanded appreciably to incorporate more visually complex channels.

Although estimates of the percent or amount of time that students viewed each receiver may be highly inaccurate judgments, they suggested a wide range of individual viewing requirements. The experimental

television treatment provided students with the ability to view visuals for longer periods of time and provided students with the opportunity to select an appropriate or meaningful visual to view. Each student made his own independent decisions rather than having to rely on the decisions of the television director.

Finally, as one student indicated, it was easier to follow the material presented on two receivers because there was not continual cutting between the image of the instructor and the visuals as is typified in a conventional television presentation. In a conventional television treatment, each time a visual appears on the television screen the image of the instructor is removed. When the instructor's image is blocked from reaching the student, there is reason to suspect that some interference occurs which inhibits effective communication. The student may be forced to miss a miriad of facial and gestural cues.

In the experimental treatment, the image of the instructor was available throughout the entire presentation. The student was thereby able to make eye contact with the image of the instructor at any time.

## CHAPTER IV

# SUMMARY, CONCLUSIONS, AND IMPLICATIONS FOR FUTURE RESEARCH

An exploratory study was designed to obtain information concerning the relative effectiveness of an experimental television treatment in which two video channels were used to present different but related visual materials simultaneously.

## Summary

Three groups of students were randomly selected from a population of students enrolled in an introductory course in the Department of Television and Radio at Michigan State University.

Treatment I, the experimental television treatment, presented a twelve minute television message to twentyone students in the group. Two television receivers were placed in the classroom. Each receiver carried different visual information simultaneously. The left receiver projected the image of the instructor throughout the entire presentation while the right receiver conveyed the visuals or graphics which were used to supplement the instructor's message. Students were expected

to view the receiver which was most appropriate to their particular communication requirements at any time and for any particular length of time.

Treatment II, the conventional television treatment, presented a standard television presentation to twenty-one students. The image of the instructor and the visuals or graphics were alternated in a single video channel.

The audio tracks, visuals, and the shot of the instructor were identical for both television treatments.

In Treatment III, the control treatment, twentyone students received no instruction.

A three part questionnaire was designed to elicit achievement scores and student evaluation of the television treatments.

The first part obtained achievement or Information Accrual scores for each group of students. The mean scores for each group were compared statistically through a one-way analysis of variance. The results of the oneway analysis of variance indicated that there was a significant difference in Information Accrual scores among the three groups of students at the .05 level of confidence.

A posteriori comparisons between individual pairs of means were computed using the conservative Tukey (a) procedure. The results of the Tukey (a) indicated that the experimental television treatment group scored significantly higher on Information Accrual than the control group which received no instruction. Likewise, the conventional television treatment scored significantly higher than the control group. The Tukey (a) procedure failed to reveal significant differences in Information Accrual scores between the experimental television treatment and the conventional television treatment at the .05 level of significance.

The second portion of the questionnaire was administered to both television treatment groups. Its purpose was to obtain general information describing the population, to report student attitudes, and to evaluate certain elements of the television presentations. The students reported little previous experience with the subject matter of the television message. The majority indicated they had had some prior exposure to instructional television at the college level.

Students from both groups reported generally favorable attitudes toward the television instructor and his ability to communicate effectively. Both groups of students reported that their respective television presentations were "better" than most educational television to which they had previously been exposed. Less than half of the students in the conventional television presentation compared with all students in the experimental treatment indicated having ample time to study the visuals.

The third section of the questionnaire was administered only to the group of students who received the experimental television treatment. Its purpose was to obtain specific information concerning the attitudes of students toward the experimental treatment.

Students indicated generally favorable attitudes toward the experimental television treatment. They reported experiencing very little confusion in shifting their attention between two different visual sources. Further, they reported having no difficulty in deciding which visual channel to view at any particular time. The receivers were spaced so that the students could shift their attention between them without difficulty or interference. There seemed to be no correlation among students concerning the estimated amount of time spent viewing each receiver. This seemed to substantiate the ability of the experimental treatment to provide for individual differences. The majority of the students indicated that they enjoyed the experimental treatment and expressed enthusiasm for the future of instructional television systems of this nature.

## Conclusions

The following conclusions may be drawn from the investigation:

1. A television treatment was designed which was capable of reducing the interference which was presumed

to have resulted from the television director or gatekeeper in a one-way flow of communication. The television system which presented two different visuals simultaneously demonstrated that it was capable of providing each student with the ability to determine for himself something which is usually determined by the television director -- which visual source to view at any particular time and the amount of time to view each visual source. Further, the experimental system, by requiring students to make a selection between visual channels, succeeded in involving the student to a greater extent than is typical of most instructional television presentations which provide only a single receiver for the student to view. Students were not merely observing but were interacting with the presentation. Finally, the system provided a means whereby the image of the instructor was available throughout the presentation for the student to receive a maximum amount of non-verbal communication cues, coded in the language of facial expressions and gestures. The student could view the image of the instructor at any time throughout the presentation to obtain these nonverbal cues.

2. Both television treatment groups scored significantly higher Information Accrual scores than the control group which received no instruction. There was, however, no significant difference between the

experimental television treatment and the conventional television treatment in terms of Information Accrual. The experimental and conventional television treatments produced almost identical levels of achievement.

3. The most obvious advantage of the experimental television treatment was its ability to provide each student with ample time to study the visuals. Secondly, the image of the instructor, available to the student at any time throughout the presentation, and the visuals, conveyed through two different channels, provided each student with the opportunity to act as his own gatekeeper in selecting for himself the most appropriate visual source.

# Implications for Further Research

Although the Information Accrual scores awarded no statistical advantage to the experimental television treatment, the attitudes of students toward the use of two television receivers to carry different visual material simultaneously were encouraging.

Additional research is necessary to determine those conditions under which multiple channels of communication will be most successful.

The strength of the instructor's image to aid communication was not nearly substantiated by this study. Additional information is needed concerning the psychological effects on learning of the image of the instructor.

The television message topic used in this study was perhaps too simple to merit such a complicated treatment. The experimental treatment might have been better suited to situations in medicine, biology, accounting, etc., where it is perhaps more advantageous to provide the student with more than one source of visual information simultaneously.

Finally, instructional television must find new ways to provide students with a maximum opportunity for interaction within the learning situation. The total involvement of the student in the learning process should be the goal of instructional television.

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APPENDICES

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APPENDIX I

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THE TELEVISION MESSAGE

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ne en mente anno national martinet		n ann a chuir an tha ann an thairtean an an tha ann an thairtean a	· "你们,你们们就是你们的是你们的?""你们的?""你们的?""你们就是我们就是我们的吗?""你们就是你们,你们们就是你们,你们们们就是你们的?""你们,你们们也
CONVENTIONAL	EXPERITER	TAL TREATERIT	01. III X
	LEFY RECLIVER	KIGET RECEIVER	OFGON
ТТТЕ ЗЕПРЕ НСТР ЈО ЗЕСТРЕ	TITLE SLIDE HOLD IO SECOND	TTLF SLIPE	
KEDTUK SPOT IRSTRUCTOR	EFDICE SLOT INTERCOR		<u>HECTETCE:</u> If you've even studied a rap of the world, <u>you've pre</u> tally noticed the similarities tetween the Atlantic Constlines of South Americs and Africa.
MAP OP SOLTH ACHAILOA Alb Africa		IZP CP SCUL ATHEOR Allo Abbica	In fact, when the continents are drawn together like a digraw-gunnic the similarities of the constlines are even note grownes!
KEDICE SECTIFICATION			The fige that these continents were once folmed and then, through some force within the carth, separated, leads to the fascinating study of <u>Continental inif</u> (), our topic in today's learch. The first comprehensive theory of continental drift arreared in 1917 by the German meteorologist Alfred Werener.
EAP OF GOILWARA		VITE TO BE 40 AVA	According to Negener all the continents had teen joined about 200 million years age in a single "super-continent" colled <u>Gondwang</u> .
MADICA ERCA INTERUCTOR			Then, under the active of forces associate with the rotation of the earth, the continents had troken apart, equation of the Atlantic and Indian Occans. rotation of the Atlantic and Indian Occans. retween 1970 and 1994 Kerener's hypethesis excited great controversy. Hypetcists found kerener's projectific inndequate and expressed doubt that the continents could move laterally. Geologiats attempted to demonstrate that the defined with that the continents could move laterally. Geologiats attempted to demonstrate that the fact of the ratter retains that through recent genes there has been contributed to widence in favor of out the fact of the natter retains that through recent years there has been contributed to widence in favor of out the fact of the natter retains that through recent years there has been contributed to widence in favor of
LTS OF THE SAFES		nur er tære ta tat	Loday, we will investigate three different corollaries that attempt to provide evidence in support of the theory of continental drift: Paleomagnetism, Convection Currents within the carth, and the movement of Oceanic Islands.

PUNTIN		
MEPTUN SHOT INSTRUCTOR	·	First, and probably least exciting of the three corollaries is the study of Paleemagnetismmeaning "Early Magnetism."
DIAGRAM OF EANCH AND BAR MAGNET	DIAGRAM OF EARTH AND Ban Magney	The carth, as you know, is a large dipole or two-pole magnet. Its characteristics are similar to those of a common her remote with hour a north and contrologic
NEDIUM SHOT INSTRUCTOR		common year magnet. Four nave a north and south pure and both are capable of attracting from-bearing minerals such as Kagnetite and Hematite.
DIAGRAM OF FARTH'S AXIS	DIAGRAFE OF EARTH'S AXIS	Falcomagnetism is based on the assumption that through- out millions of years the magnetic poles of the earth have remained more or less coincident with the poles of the carth's axis of relation. In other words, although the magnetic poles of the earth have drifted slightly they have not deviated to any great extent from the direction of the earth's exist of notation.
MEDIUM SHOF INSTRUCTOR		Like any magnet, the earth's magnetic poles are capable of attracting certain minerals or materials. This is exactly what happens.
FIXED MINERALS DIAGRAN	FIXED FILLERALS DIAGEAN	In a lave flow, for example, iron-bearing minerals are influenced and attracted by the magnetic field of the earth. As the lave coels and hardens, the direction of Magnetite and Hematic minerals are solidified and their direction is fixed.
MEDIUM SHOT INSTRUCTOR		This fixation of the direction of magnetically attract- able minerals also occurs in sandstone where the minerals become oriented to the earth's magnetic field while the sandstone is being deposited. The lava flows and sandstones, then, contain a magnetism that is purallel to the direction of the earth's magnetic field. Even theugh the force of the magnetism is minute, measurements of the orientation of the regults.
UNPARALIEL MINERALS Diagram	UNPAPALJEL KJUFRALS DIAGRAK	For example, if the direction of the minerals varies greatly from the direction of the earth's magnetic poles, we can assume that there has been movement of the rocks.
MEDIUM SHOT INSTRUCTOR		When this evidence appears over an entire continent it would seem to support the idea that, indeed, since the creation of that continent, there has been lateral movement of the land mass. The second area of discussion and probably the most significant support of continental drift is found in the study of <u>convection currents</u> under the surface of the earth.

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CONVENTIONAL,	EXPERIM	SWTAL TEEATTERT	AUDIO
	LEP'' RECEIVER	RIGHT RECEIVER	1
MEINESZ NAME CAHD		METRESZ HARE CARD	More than 30 years ago a butch geophysicist, Felix A. Vening Meinesz demonstrated through use of a gravimeter on a submerged submarine that some fere stronger than gravity pulls the erust into the depths of off-shore trenches.
HESS NAME CARD		HEES HARE CARD	This evidence was followed by H. H. Eess of Princeton University who hypothesized that "Higges form where convection currents rise in the earth's mantle."
MEDIUM SHOT INSTRUCTOR			Fost oceancrarkers substantiate Ress's hypothesis that ridges <u>do</u> , in fact, form where convection currents rise.
FRICTIONAL PRAG DIAGRAM		PEICTIONAL LEAG DIACHAN	Earth scientists generally agree now that conviction currents result from scare source of great heat in the mantle which generates movement in the form of giant convection cells.
REDIUK SHOT INSTRUCTOR			This reverent of the manule at high temperatures places a frictional drag on the earth's crust.
DIAGPAN OF KISING CURNENUS		DIAGEAN OF FISING CURFENUS	In other words, convertion currents fise vertically through the rantle. The rising convection currents at the same time carry molten lava to the surface.
MEDIUM SHOT INSTRUCTOR			Hear the surface the convection currents nove laterally with a force capable of deferring the earth's crust.
RIFT DIAGRAS		ELEC 14 AGEAL	The surface rocks are troken by tension caused from the lateral movement of convection currents near the crust. A rift results which is filled by the altered top of the mantle and by the flow of basalt lavas.
KEDIUR SHOT INTIRCTOR			In contrast with earlier theories of confinental drift that required the continents to be driven through the crust like ships through a frequence, this mechanism neved them passively by the lateral movement of the crust away from the source of workfoal convection.
MOURTATH BUILDHIG DIAGEAN		gertrah buttang Magrax /	The continents, having been built up by the accurula- tion of lighter and nore sillecous iterials brought up from below, are not dragged down at the trenches where the convection currents descend, but pile up there in the ferm of mountains.

From the physical point of view, the convetion cells in the mantle that drive these currents on assume a variety of sizes and configurations, starting up and sleather duen from the to the extremts ray follow a single tracting. The flow of the currents ray follow a single pattern for a time, but the pattern should occarionally chatter due to variation in the output and transfer of heat from within. Inus, it is possible to exploin the period follow of nountain-building and the random and approtrieal dis- tribution of the continents.	The third area of evidence in favor of continental drift error from information concerning the development of formule [Flands. Che concept [Flands. The concept [Flands. The concept [Flands. Continent: have teen fixed-that is if they have remain d staticnary for millions of years-then the ocean lashes should be as only as the continents. If, on the other hand, infit has prepared, then some regions of the contains for the operan floor should be subject that the lash of drift. It turns cut that the are of the islands in the Atlantic from the floor the floor the reducted of the islands in the Atlantic from the mid-toconder to increase with their distance from the mid-toconder that the are of the islands in the Atlantic from the mid-toconder to increase with their distance from the	If we take a look at a crock section of an island chain, this conset is guity evident. We begin with a vurtissi flow of lars along the Atlantic ridge. The lava derveley into a velcarie island. Unlie the velcanic island is developing it is subject to the nevements of convection currents.	The convection currents move the foland laterally away from the ringe. Effer the volcanic island is no longer in a position to carry vertical flows, a second folar i is built in the same manner. This process, over time, creates a chain of velcar ic islands.	The increase in are with distance from the ridro ug- gests that if the more distant islands are of volvanic origin, then lateral movement of the ocean floor has carried them away from the ridge.	In actuality, their ages and distances from the sidge indicate neverant at the rate of two to six centimatend per year. This is the same estimated velocity of convection currents. Foday we have presented three types of evidence sup- porting the theory of continental drift, Additional evidence may be found in other selences such ar climatology and belary. Thank you very much for your attention.
	H	ICLARI, CRAIL LIAIRAN		GIRER TSIALLS DI AREAL	TTSLE SELEC TTSLE SELEC
					TTTLE SLUF
MEDIUN SHOT INSTRUCTOR	ACIONALSHI LOHS WALANA	ISLATE CHATH DIAGFAN	RELUCT SHOT THEFT OF	CULAR ISLANDS DIRGRAM	REDIUM CHOT JERTROCTOR LITTE CLIDE Cold 10 DACENDS

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# APPENDIX II

# INSTRUCTIONS FOR ADMINISTERING THE EXPERIMENT AND QUESTIONNAIRE

The graduate teaching assistants who administered Treatment I and Treatment II introduced the experiment to their respective groups by reading the following statement:

The Department of Television and Radio is currently conducting research concerned with educational television at the college level. In a few minutes you will be asked to view a portion of a television lecture. Following the lesson you will be given a short quiz that covers information contained in the television lesson.

Following the television treatment the graduate assistants introduced the questionnaire by reading the following statement:

I will now hand out a short quiz based on information contained in the television lecture which you have just seen. Before you begin, write your name and student number on the front page of the test booklet.

In the first part of the quiz, answer the questions by clearly printing the letter of the correct response in the box to the left of the statement.

In the second (and third) part(s) of the quiz are questions concerning the television presentation itself. Answer the statements with a "YES" or "NO" answer. You should use the blank spaces following the statement to explain your answer.

Your comments may be as brief or detailed as you feel are appropriate. Take your time and answer each question thoughtfully and to the best of your ability.

The graduate teaching assistant who administered only the Information Accrual portion of the questionnaire to Treatment III (the control group) read the following statement:

The Department of Television and Radio is currently conducting research concerned with educational television at the college level. I am going to hand out a short quiz in which you are to answer the questions to the best of your ability. Before you begin, write your name and student number on the front page of the test booklet.

Answer the questions by clearly printing the letter of the response that seems most correct in the box to the left of the statement.

Please take your time and think about each question carefully.

After students in the control group had completed their test, the graduate assistant read the following

statement:

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Before I collect your papers will you please turn your test booklet over. If you have studied Continental Drift or any of the material in the test, write the word "Yes." If you have never studied Continental Drift, write the word "No."

# APPENDIX III

# THE QUESTIONNAIRE

Name\_\_\_\_\_

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Student Number\_\_\_\_\_

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Based on the information contained in the television presentation you have just seen, supply the best answer to each of the following questions. Clearly print the letter of the correct response in the box to the left of the statement.

 Two hundred million years ago there existed a single "super-continent" called



- e. Glossopteris
- 2. The first comprehensive theory of continental drift appeared in

<b></b>	٤.	1912	Ъу	Alfred Wegener
	ь.	1904	Ъy	Karl Meinesz
	с.	1919	by	Wilfred Vishnu
	d.	1929	Ъу	Max Dietrich
	e.	1921	by	Eric Weber

3. The theory of paleomagnetism assumes that throughout millions of years the magnetic poles of the earth have

-	-	-	-
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			•
			- 1

- a. moved drastically
- b. remained stationary
- c. wandered randomly
- d. moved periodically
  - e. drifted slightly
- 4. Two minerals which contain magnetic properties are

а.	Anhydrite	and	Hematite
ь.	Magnetite	and	Hematite
с.	Flourite	and	Magnetite
d.	Hematite	and	Halite

- e. Magnitite and Anhydrite
- 5. When magnetic minerals are deposited in lava and sandstone the direction of the magnetic minerals becomes



- b. unstable
- c. fixed
- d. weakened
- e. unpredictable

6. Scientists can provide Paleomagnetic evidence for continental drift if magnetized minerals

 а.	have become strengthened in magnetic power
Ъ.	have become weakened in magnetic power
с.	are pointing away from the earth's poles
d.	are pointing away from the ocean ridge
e.	have remained constant in magnetic power

- 7. Two man who contributed greatly in developing the theoretic basis for convection currents are
  - a. Meinesz and Hess
  - b. Vening and Meinesz
  - c. Felix Hurst and Hess
  - d. Vening and Hess
    - e. Felix Hurst and Vening

8. Most earth scientists agree with the hypothesis that ridges occur



9. The downward force in the offshore underwater trenches is

a. b.	equal to the force of gravity one-half the force of gravity
с.	less than the force of gravity
d.	greater than the force of gravity
e.	proportional to rising convection currents

10. Over great periods of time the movements and speeds of convection currents are

 a.	constant				
b.	predictable	in	direct	ion	only
с.	predictable	in	speed	only	7
d.	predictable	in	speed	and	direction
e.	variable				



- a. rifts in the earth's surface
- b. great sources of heat in the mantle
- c. forces associated with the earth's rotation
- d. earthquakes near the earth's surface
- e. mantle cooling near the earth's surface

12. Frictional drag on the earth's crust results from



 Scientists can determine the relative age of oceanic island chains by

 а.	the number of islands in the chain
Ъ.	the size of the islands
с.	their distance from the nearest continent
d.	their distance from the oceanic ridge
 e.	their distance from the nearest island

14. Movement of islands away from mid-oceanic ridges occurs at a rate of



15. Movement of islands away from mid-oceanic ridges is



- a. less than the rate of movement of convection currents
- b. greater than the rate of movement of convection currents
- c. equal to the rate of movement of convection currents
- d. equal to the rate of rising mantle
- e. unrelated to the movement of convection currents
### PART II

Please respond to the following statements concerning the television presentation which you have just seen. Use the blank spaces to comment critically or favorably to the statement. Your comments may be as brief or detailed as you feel appropriate.

		• •
Have you studied Continental Drift prior to	YES	NO
EXPLAIN		
Have you ever taken a college course by tele- vision?	YES	NO
EXPLAIN		
Would you rate this television lesson as being "better" than most educational TV?	YES	NO
EXPLAIN		
·		
Were the questions in the multiple-choice test representative of material covered in the TV presentation?	YES	NO
EXPLAIN		
Was the television presentation confusing to watch?	YES	NO

PART II - 2

ό.	Did the television teacher communicate ef- fectively?	YES	NO
	EXPLAIN		
7.	Was the teacher interesting?	YES	NO
	EXPLAIN		
8.	Did the visuals (maps and diagrams) help to clarify the instructor's lecture? EXPLAIN	YES	NO
9.	Were the visuals clear and interesting?	YES	NO
10.	Could the lecture have been as effective with- out the visuals?	YES	NO

11.	Did you have enough time to study the visu	als?	YES	NO	
12.	Was the television presentation interestin	g?	YES	NO	
	EXPLAIN				
•					

### PART III - 2

Did you like the television presentation?	YES	NO
EXPLAIN	-	
	- -	
Were the two television receivers too far apart?	YES	NO
EXPLAIN	-	
What criticisms do you have of the television just seen?	- n presentation	you hav
		· ·
What favorable comments do you have concernir presentation you have just seen?	g the televis	ion

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### PART III

Please respond to the following statements concerning the television presentation which you have just seen. Use the blank spaces to comment critically or favorably to the statement.

EXPLAIN	Did you find it confusing to watch two television receivers?	YES	NO
About how much time did you spend viewing each television receiver? RECEIVER WITH TEACHERPercent RECEIVER WITH VISUALSPercent Were you able to direct your attention between the two TV receivers without difficulty? YES NO_ EXPLAIN Are two television receivers more interesting to watch than one? YES NO_ EXPLAIN	EXPLAIN		
About how much time did you spend viewing each television receiver? RECEIVER WITH TEACHERPercent RECEIVER WITH VISUALSPercent Were you able to direct your attention between the two TV receivers without difficulty? YES NO ENPLAIN Are two television receivers more interesting to watch than one? YES NO			
About how much time did you spend viewing each television receiver? RECEIVER WITH TEACHER Percent RECEIVER WITH VISUALS Percent Were you able to direct your attention between the two TV receivers without difficulty? YES NO_ ENPLAIN Are two television receivers more interesting to watch than one? YES NO_ ENDLAIN			
RECEIVER WITH TEACHERPercent RECEIVER WITH VISUALSPercent Were you able to direct your attention between the two TV receivers without difficulty? YES NO_ EXPLAIN Are two television receivers more interesting to watch than one? YES NO_ EXPLAIN	About how much time did you spend viewing each television receiver?		
RECEIVER WITH VISUALSPercent Were you able to direct your attention between the two TV receivers without difficulty? YES NO EXPLAIN Are two television receivers more interesting to watch than one? YES NO EXPLAIN	RECEIVER WITH TEACHERPercent		
Were you able to direct your attention between the two TV receivers without difficulty? YESNO EXPLAIN	RECEIVER WITH VISUALSPercent		
EXPLAIN	Were you able to direct your attention between the two TV receivers without difficulty?	YES	NO
Are two television receivers more interesting to watch than one? YESNO_	EXPLAIN		
Are two television receivers more interesting to watch than one? YES NO			
דייים א דאן	Are two television receivers more interesting to watch than one?	YES	NO
	EXPLAIN		

## APPENDIX IV

## RESPONSES TO THE QUESTIONNAIRE

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	Question		Treatment I Experimental		Treatment II Conventional		
		Yes	No	Yes	No		
1.	Have you studied Continen- tal Drift prior to today's television presentation?	4	17	3	18		
2.	Have you ever taken a col- lege course by television?	19	2	18	3		
3.	Would you rate this tele- vision lesson as being "better" than most educa- tional TV?	14	7	9	12		
4.	Were questions on the mul- tiple-choice test represen tative of information covered in the TV presen- tation?	- 18	3	18	3		
5.	Was the television presen- tation confusing to watch?	6	15	8	13		
б.	Did the teacher communicat effectively?	e 17	4	15	6		
7.	Was the teacher inter- esting?	13	8	13	8		
3.	Did the visuals (maps and diagrams) help to clarify the instructor's lecture?	21	0	19	2		
9.	Were the visuals clear and interesting?	19	2	19	2		
10.	Could the lecture have been as effective with- out the visuals?	0	21	2	19		
11.	Did you have enough time t study the visuals?	0 21	0	9	12		
12.	Was the television presen- tation interesting?	16	5	15	6		

# RESPONSES TO THE GENERAL INFORMATION PORTION OF THE QUESTIONNAIRE

	Questian	Treatm	nent I
	Question	Yes	No
1.	Did you find it con- fusing to watch two television receivers?	6	15
		Receiver with Teacher	Receiver with Visuals
2.	How much time did you spend viewing each television receiver?	80% 80 80 80 75	20% 20 20 20 25
		75 75 70 65 60	25 25 30 35 40
		60 50 45 40 40	40 50 50 60
		35 35 25 25 10 9	65 65 75 90 91
		Treatm	nent I
		Yes	No
3.	Were you able to direct your attention between two receivers without d	the ifficulty? 18	3

RESPONSES OF ATTITUDES TOWARD THE EXPERIMENTAL TREATMENT

		Treatm	ent I	
	Question	Yes	No	
4.	Are two television receivers more interesting to watch than one?	16	5	
5.	Did you like the television presentation?	16	5	
б.	Were the two television receivers too far apart?	4	17	

Responses of Attitudes Toward the Experimental Treatment (continued).

