DOCUMENT RESUME

ED 235 539 CS 504 399

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TITLE Mental Effort and Learning from TV: Comparing Expectations for PBS and Commercial Network Programming.
PUB DATE May 83
NOTE 37p.; Paper presented at the Annual Meeting of the International Communication Association (Dallas, TX, May 26-30, 1983).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Audience Analysis; *Cognitive Processes; College Students; *Commercial Television; Communication Research; Comparative Analysis; Expectation; Higher Education; *Knowledge Level; *Programing (Broadcast); *Public Television; Student Attitudes; *Television Research; Television Viewing

ABSTRACT

A study investigated the idea that the amount of knowledge viewers extract from exposure to television is a function of the amount of mental effort involved in processing the program content, and that the mental effort invested in viewing is partly a function of people's expectations about the demand characteristics associated with the content. Since research data have established that people report using greater mental effort for viewing Public Broadcasting Service (PBS) programing than for commercial network shows, subjects in two experimental conditions were told that they were going to view a show intended for broadcast on PBS, while those in the other two conditions were told that the same show was to be shown on commercial television. In addition, one group in each condition was told that it would be asked to evaluate the show after viewing, while the other two groups were told that they would have to complete a questionnaire afterwards. Immediately after viewing, all students completed an instrument measuring their affective responses to and learning from the show. Results showed a trend of increased learning from the groups told that the program was designed for PBS, although this was over-ridden in the group warned that it would be questioned afterwards. The mental effort reports were inconsistent with previous research showing greater effort being used for PBS program content. (FL)

MENTAL EFFORT AND LEARNING FROM TV: COMPARING EXPECTATIONS FOR PBS AND COMMERCIAL NETWORK PROGRAMMING

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Paper presented at the annual conference of the International Communication Association, Dallas, Texas, May, 1983.

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Abstract

Extensive research suggests that little mental effort or concentration is utilized during much of the time Americans spend watching TV. This paper argues that the amount of knowledge viewers extract from exposure to television is a function of the amount of mental effort that is invested in processing the program content, and that the mental effort invested in viewing is partly a function of people's expectations about the demand characteristics associated with the content. Survey data establishes that people report typically using greater mental effort for viewing Public Broadcasting Service programming than for commercial network content. Thus, to assess the hypothesized relationships, 85 undergraduates viewed the identical TV program, with random assignment to conditions that introduced the program as being designed for broadcast on either (1) the PBS network, or (2) commercial network TV.

Subjects' learning scores after viewing indicated a trend of increased learning from the group told that the program was designed for PBS, although it was found that this effect was overridden by warning subjects that they would be questioned about the program after viewing. Mental effort reports gathered subsequent to the experimental treatment, however, were inconsistent with the previous finding of greater effort being used for PBS content. Implications of the research, especially in the area of cross-media studies of learning differences, are discussed.

MENTAL EFFORT AND LEARNING FROM TV:

COMPARING EXPECTATIONS FOR PBS AND COMMERCIAL NETWORK PROGRAMMING

Television as a medium is generally characterized in American society as an undemanding stimulus. While TV is capable of occasionally capturing the rapt attention of almost the entire nation for a media event, it is much more often considered as shallow entertainment, something worthy of only peripheral attention. Frequently reported motivations for TV viewing include "it keeps me company," "it helps me to relax," and "it gives me something to do when nothing else is going on," none of which suggest much effort on the part of the viewer.

Certainly, numerous factors influence the degree of attention people pay to television. Many characteristics of the medium itself, such as its constant availability and its easy access in the home, are likely to play a role in this process. However, while the factors which influence people's attention to TV have not been well defined, there is extensive evidence which indicates that little attention is paid to programming content during a substantial proportion of the time people spend "watching" television.

Allen (1965) provided the earliest empirical evidence directly examining the question, to what extent are people actually paying attention to TV when the set is turned on? Allen's data, gathered during the 1961-62 and 1962-63 TV seasons, indicated that a full forty percent of the time the TV was turned on there was no one paying attention to it. Lack of attention in this study was comprised of either no one present in the viewing area or no one in the viewing

area looking at or facing the TV screen.

Bechtel, Achelpohl, and Akers (1972) reported quite similar findings to those of Allen. Using a similar definition of viewing attention, Bechtel et al. found a substantial proportion of the time the TV set was on to be non-viewing time. Overall, non-viewing ranged from a high of 45 percent of the time during commercials to a low of 24 percent of the time during movies.

Even when attention is focused on TV viewing, other activities may frequently distract the viewer. Szalai (1972) reported more than one-fourth of all viewing by American adults to be secondary to some other activity, such as eating, housework, or social interaction. Csikszentmihalyi and Kubey (1981) found secondary activities accompanied TV watching a full two-thirds of the time spent viewing. In sum, television viewing is best characterized as a discontinuous, often interrupted, and frequently non-exclusive activity (Comstock, Chaffee, Katzman, McCombs, and Roberts, 1978).

Certainly, this context for viewing has some relationship to the expectations viewers bring with them to the viewing environment, which should in turn influence the effects of such programming on the audience. The fact that viewers can so easily come and go during the middle of a program suggests that they are investing little effort or concentration in the viewing process, an assumption supported by the fact that a high proportion of TV viewing time is spent engaged in some

other activity besides the viewing itself. However, research examining the degree of mental investment people make during everyday TV viewing has been scant.

Csikszentmihalyi and Kubey (1981) used a unique approach to study the mental states people experience while watching television. They provided a sample of adults with electronic paging devices and a package of self-report questionnaires examining the quality of the individual's cognitive interaction with the environment (whether the subject felt challenged by the activity, whether he or she was concentrating, and how high the person perceived his or her skills for each activity to be, among others). The "beeping" of the paging device was used by the researchers to signal respondents to complete a questionnaire form, thus gathering responses in a relatively unobtrusive manner while people were actually involved in their everyday activities. The researchers signalled respondents during all waking hours, thus cutting across all types of activities, including TV viewing.

The results of this study indicated that TV viewing was experienced as the least challenging of all activities and the one involving the least amount of skill. When results were analyzed using a dichotomy comparing responses gathered during TV viewing to responses gathered during all other activities, mean levels of concentration, challenges, and skills were found to be significantly lower for TV viewing than the average levels of all other activities combined. Csikszentmihalyi and

Kubey conclude:

> Television viewing was consistently and closely tied to relaxation, to weaker cognitive investments, and to lower feelings of potency when compared to other activities. The study suggests that this experience is modified to some extent by the context in which people view, but that the general trends associated with TV viewing remain largely intact regardless of context.

Certainly it is the case that television as a medium is capable of providing programming which stimulates a high degree of mental activity and provides an opportunity for learning. However, it is also the case that the unique structure of the American commercial TV broadcasting industry has resulted in a preponderance of light entertainment style programming dominating the airwaves. Much of this type of programming provides viewers with the opportunity to sit down at almost any time, turn on the TV set, and be immediately "entertained" without the benefit of having seen the beginning of a program. Along the same lines, interruptions during the viewing of a program, such as answering a telephone call or leaving the home entirely for some other engagement, are typically accepted by most TV viewers. Given this context, it is of little surprise that viewers invest little mental effort during their TV viewing hours, walking in and out of the viewing area while intermittently watching a program or paying secondary attention to the TV while performing some other task.

If one accepts the proposition that most Americans perceive TV as an undemanding medium, what implications does this hold for the study of TV's effects on the audience?

To explore this question, one must first examine the influence that perceptions of a social stimulus such as television are expected to have on people's behavior. Neisser's (1967, 1976) construct of anticipatory mental schemata provides an excellent framework to use for understanding behavioral outcomes in this area.

Neisser asserts that individuals develop a series of mental operations, called mental schemata, to be applied to particular types of cognitive input. A mental schema (singular) is a routinized approach for dealing with some categorized perceptual input, or in more simple terms, a "mind set." A schema develops from an individual's past experience with the relevant stimuli and consists of the operations devised to organize the mental processing of such stimuli. For example, one would expect that people develop a schema for processing information when watching TV, and that this schema differs from the mental framework employed in processing other types of communication, such as listening to the radio or reading a book.

Schemata can be general or specific, restricted or elaborate. In addition, many schemata are hierarchically connected and embedded with other related schemata in complex ways. Thus, it is conceivable that people would maintain mental schemata for processing particular TV programs or particular types of TV programs, just as they would for processing TV content in general.

Complicating this process somewhat is the degree to which the mental processes engaged in are automatic or con-

trolled (Schneider and Schiffrin, 1977; Schiffrin and Schneider, 1977). Automatic processing occurs at a low level of self-consciousness and follows a nearly identical path each time it occurs (e.g., turning a screw clockwise to tighten it without having to analyze its thread structure). Exercising these automatic schemata can be conceived of as operating within a closed system, in which predictability is nearly 100 percent. Controlled processes, on the other hand, are mental activities of which one is aware (e.g., a child learning which way to turn a screw to tighten it). Exercising controlled schemata can be likened to an open system, in which predictability is not high and the possibility of drawing upon other mental systems is well above zero.

In addition to the degree of automaticity, the number of mental elaborations (mental acts or independent but linked thoughts) necessary to completely process some cognitive input will determine the configuration of the outcome of such processing (Craik and Tulving, 1975). That is, the more elaborations necessary to process input, the more connections will be made with other schemata, thus increasing interconnectedness of the schemata and the degree to which the input will be retained in easily retrievable memory.

Salomon (1981 a,b) has argued that these two components of processing, automaticity and elaborateness, combine to form the amount of invested mental effort (AIME) which is applied to any given mental schemata. The relationship he proposes is as follows:

$$\text{AIME} = \text{number of elaborations} \times \frac{1}{\text{automaticity}}$$

This formula clearly suggests that those mental processes which require the greatest amount of invested mental effort are those which utilize many elaborations and are highly controlled, and conversely, those mental processes which require the least amount of invested mental effort are those which employ few elaborations and are highly automatic.

A strong relationship between AIME and learning should be expected based on the simple concept that, all other things being equal, the more one thinks about or concentrates on some material, the more one learns. Salomon (1981 a,b) provides a review of empirical studies which consistently demonstrate that the more elaborate the mental processing undertaken, the more learning which results. Along the same lines, Chu and Schramm (1967) reviewed a myriad of instructional television studies and concluded that conditions providing greater motivation (and presumably greater effort), such as anxiety arousal or the expectation one will have to use the instructional content, foster increased learning from TV exposure.

Allison and Ash (1951) provide a typical example of the influence of anxiety arousal on motivation and subsequent learning. The researchers showed a film to subjects divided into three groups. Before seeing the film, the first group received anxiety-producing instructions (i.e., the film was difficult), the second group received anxiety-relieving instructions (i.e., the film was easy), and the third group received neutral instructions. Results from a learning post-

test showed that the group which received the anxiety-producing instructions had significantly higher learning scores than the group which received neutral instructions, which in turn had higher scores than the group which received anxiety-relieving instructions.

When differing outcomes result from exposure to the same stimulus, differences in the perceived demand characteristics (PDC) of the stimulus situation may provide the explanation for such phenomena (Salomon, 1981 a,b). For example, two students enroll in a college biology course. One plans to go into medicine, the other into archaeology. Both possess equivalent mental abilities, but the student interested in medicine does substantially better in the course than the archaeologically-oriented counterpart. One could explain this by assuming that the first student perceives performance in the course to be important in his or her future, while the second student perceives a much weaker relationship between course performance and future. Influenced by the greater PDC, the first student then exerts greater effort and consequently accomplishes greater learning.

Along similar lines, the perceived demand characteristics associated with different media, perhaps even extending to expectations applied to different types of content (either within a medium or across media), may account for differences in the way such content is cognitively processed. Indeed, television as a medium is quite capable of transmitting a myriad of different types of content. In practice, however, the structure of American commercial broadcasting has worked to homogenize the available

programming with heavy doses of light entertainment (Greenberg, 1980), primarily designed to be mentally undemanding and to provide some form of escape for the viewer. Such programming could be said to generally require few mental elaborations to process, and be likely to be handled in a highly automatic fashion, thus encouraging little mental effort on the part of the viewer.

One example where a distinction between perceptions of programming types might result in the use of different mental schemata for processing would be content that is considered to be primarily informational, educational, or in some sense serious versus content that is considered to be primarily entertainment-oriented. This distinction is well represented by comparing the typical content of the Public Broadcasting Service to that of commercial network television programming. Public television programming has been reported to be generally perceived as more satisfactory, educational, serious, and the like, than television programming as a whole (Corporation for Public Broadcasting, 1977). Given these findings, one would generally expect that the perceived demand characteristics of exposure to public television programming would result in higher levels of mental effort than would those for commercial network programming.

To test this proposition, I propose comparing the responses to and attributions about a television program that is introduced as being designed for broadcast on either the Public Broadcasting Service or commercial network television. Thus,

program content may be held constant, but the perceived demand characteristics and the mental schemata utilized may be allowed to vary depending upon the introduction given the subjects.

By comparing pretreatment measures of the expected mental effort necessary to process public television (PTV) and commercial television (CTV) content, it is hypothesized that, consistent with past research:

> H_1: The expected mental effort typically used to process public television programming will be greater than that for processing commercial television programming.

Once this foundation has been established, the influence that these varying levels of mental effort exert on learning from exposure to the stimulus program can be examined. Using a posttest measuring learning after viewing, it is expected that:

> H_2: The amount of learning from a high PDC condition (PTV) will be greater than the amount of learning from a low PDC condition (CTV).

Further, to increase the likelihood of observing significant differences between subject groups, half of the subjects in each of the two treatment conditions will receive instructions warning them that a learning posttest will be given, which should further enhance the PDC of the experimental condition. The remaining subjects will only be told that the researchers would like their reactions at the conclusion of the program. Thus, the experiment will consist of a 2 x 2 factorial design, manipulating the type of program (CTV/PTV) and learning set instructions (high/low) given the subjects (see Figure 1).

To review and summarize, it has been suggested that little mental effort or concentration is utilized during much of the

time Americans spend watching TV. It has also been argued that the amount of knowledge one extracts from exposure to television is a function of the amount of mental effort that is invested in processing the program content. Further, it has been argued that the mental effort invested in processing mediated material is partly a function of people's expectations of the demand characteristics associated with the medium delivering the material. The proposed experiment allows for the examination of these relationships by providing treatment conditions which should manipulate subjects' perceptions of the demand characteristics associated with the viewing of a television program, while maintaining the programming content as a constant across all conditions. Thus, by manipulating perceptions but not program content, this research can empirically explore the theoretical relationships posited.

METHODS

Since it was necessary to test and validate the first hypothesis before proceeding with the remainder of the study, the following survey-style research was conducted separate from and prior to the experimental portion of the project.

An instrument examining the mental effort people report using while attending to varying types of communications media was completed by 57 undergraduate students enrolled in a mass communications course at the University of Southern California. These subjects were expected to possess well developed schemata for processing both commercial and public television programs.

The sample was biased in favor of females, 63 to 37 percent.

Subjects were asked to rate the degree of mental effort they typically use in processing messages from each of ten communications media on a scale of 0 to 10, 0 representing no effort and 10 indicating maximum effort. Separate items examined both public and commercial network television. Comparison of these measures is used to examine the first hypothesis, that people tend to use greater levels of mental effort when viewing public television programming as compared to commercial network programming. Based on the outcome of these measures (to be subsequently discussed in the Results section), the proposed experimental design was conducted as follows.

Sample. Subjects for the experimental portion of the study consisted of 85 undergraduate students enrolled in mass communications courses at the University of California, Los Angeles and the University of Southern California. The sample was roughly balanced between the two schools, with 46 subjects drawn from UCLA and 39 from USC, and was slightly weighted in favor of females, 59 to 41 percent. Although ethnicity and socioeconomic status of the subjects were not recorded, the sample may be considered to reflect the traditional biases toward white upper-middle class students typical of most university populations.

Procedure. Subjects were randomly assigned to one of the four treatment conditions (recall Figure 1). In each of the four conditions, groups of up to 10 subjects viewed an identical color videotape of a previously unaired 30 minute program titled "Great Heart."

The program is a drama depicting two brothers about to join the Army during World War I. The story focuses on the dominant older brother, who develops a heart condition preventing him from joining the military, and the psychological trauma and guilt he experiences while his younger brother garners the hero's role as a soldier. The program is an independent production that was developed without any particular commitment for broadcast or distribution. The PBS network was negotiating with the producer of the program for broadcast rights at the time this research was conducted. "Great Heart" was selected for use as the experimental stimulus based primarily on meeting the criterion of appearing equally plausible as a program to be aired on a commercial or a public broadcasting television station.

The four treatment conditions vary only by the introductions which precede viewing of the program. In conditions 1 and 2, the program is introduced as one to be broadcast on one of the commercial networks. In conditions 3 and 4, the introduction indicates the program is to be broadcast on the PBS network. This manipulation is referred to as program-type, either CTV or PTV for commercial network or public broadcasting programming, respectively.

In conditions 1 and 3, the subjects were told that the researchers were performing some formative evaluation for the program and would be asking for their reactions after the viewing. In conditions 2 and 4, subjects were additionally told that the program was a serious one, one you can learn from, and

were warned that a questionnaire measuring recall and understanding of the program would follow the viewing. These added instructions were expected to raise the PDC in conditions 2 and 4, resulting in subjects reporting greater levels of mental effort for processing the stimulus than they normally would under the circumstances. This manipulation is referred to as learning set instructions. Conditions 1 and 3 represent the low learning set, while conditions 2 and 4 represent the high learning set.

Immediately following exposure to the experimental treatment, an instrument measuring subjects' affective responses to and learning from the program was administered. There was no time limit for its completion. Most subjects finished the instrument in about 10 minutes.

To allow for investigation of the influence of subjects' perceived self-efficacy in understanding the program content on their future assessment of the perceived demand characteristics associated with the genres of commercial and public television programming (not reported in this paper), a learning test feedback deception was included in the experimental procedure. This procedure consisted of the researcher providing a fabricated high or low learning scorefor each subject as soon as they completed the questionnaire. After receiving their "score," the subjects then completed some final mental effort rating scales.

Measures. The measurement instrument administered during the experimental treatment was a three part posttest. The first

part of the instrument measured subjects' likes and dislikes regarding the program. This section consisted of 10 multiple-choice items, with each item presenting three or four possible responses. This section was designed as a distractor to minimize the likelihood of subjects inducing the nature of the experiment, and the responses were not analyzed. The second part of the instrument consisted of 20 items measuring subjects' recall and comprehension of various aspects of the program just viewed. The items were presented in the same multiple-choice format as in the preceding section, with each item presenting three or four possible responses. The learning items were developed by two graduate students who were allowed to view the program as many times as necessary to create the questions. Many of the items were detail-oriented. Some required inference and/or deductive reasoning to solve.

The final portion of the instrument asked subjects to rate their mental effort for four different situations: for the program just viewed, for commercial network TV in general, for public broadcasting programming in general, and for a novel telling the same story as the program they had just seen. The last item was used as a distractor and was not analyzed. All of these items used the same 0-10 scaling format of the original survey instrument previously described.

RESULTS

Analysis of the pretreatment mental effort measures indicates that significant differences exist in people's perceptions of the amount of mental effort they typically utilize in processing

public broadcasting as compared to commercial network television programming. The mean mental effort rating for PTV was 4.35, compared to 2.98 for CTV, with the difference significant at $p < .001$ using a one-tailed t-test (see Table 1). Although the observed difference between means is not unusually large (mean difference is 1.37 on a 10 point scale), it is highly significant. This finding provides strong support for the initial hypothesis, that people use different amounts of mental effort in processing these two types of communications content.

Significant differences in learning outcomes after exposure to the stimulus program were expected based on the program-type and learning set manipulations. Table 2 presents mean learning scores for each of the four treatment conditions and for both levels of the program-type and learning set manipulations. Comparison of the learning scores by program-type reflects one predicted trend, greater learning from PTV than CTV. The mean learning score for subjects told the stimulus was a PTV program was 17.50, compared to 16.79 for those told it was a CTV program. Comparisons of the means by learning set suggests that overall this manipulation produced no difference between the subjects receiving the high and low learning set instructions. The mean learning score for the low learning set subjects was 17.10, compared to 17.26 for those receiving the high learning set instructions.

Although the learning set provided prior to viewing did not result in overall differences in learning scores (means of 17.10 and 17.26), important differences within the CTV and PTV conditions emerged. In the CTV condition, the high

learning set resulted in increased learning as expected. Subjects receiving the high learning set instructions in this condition outscored the low learning set group by a mean score of 17.28 to 16.38 (see Table 2). Surprisingly, however, this effect was not observed in the PTV condition. Subjects in that condition evidenced less variation on the learning test, with those receiving the low learning set instructions scoring about the same as those receiving the high learning set (means of 17.81 and 17.24).

A two-way ANOVA (using the SPSS fixed effects model) was conducted to examine the influence of both program-type and learning set instructions on learning outcomes. The ANOVA was repeated separately for the subjects from each of the two universities sampled to ascertain whether any differences in subject populations masked any significant relationships. No significant findings were produced from either analysis. Thus, only results from the two samples combined are reported (see Table 3).

Although neither of the main effects reached significance, it appears likely that overall the program-type manipulation is a more powerful factor than learning set instructions. The most interesting influence on learning outcomes, however, is the interaction between program-type and learning set instructions.

Rather than enhancing subjects' mental effort and subsequent learning across both the CTV and PTV conditions, it appears that the high learning set may have acted to diminish the differences that otherwise would emerge as a result of the

use of different CTV/PTV schemata. The learning performance of the subjects receiving the high learning set was almost identical (means of 17.28 and 17.24) regardless of the CTV/PTV manipulation. Those who received the low learning set, however, evidenced a substantial difference in the predicted direction, with the PTV group outscoring CTV, 17.81 to 16.38 (see Figure 2).

Mean learning scores for the four treatment groups were compared using a Scheffé post hoc comparison. For subjects receiving the low learning set, the difference in learning scores was significant at $p < .06$. For subjects receiving the high learning set, the learning differences did not approach significance.

To summarize the influences on learning outcomes, the program-type and learning set manipulations did not separately influence learning outcomes as predicted. Rather, they evidenced an interaction effect whereby predicted differences in learning emerged as a result of the use of a CTV or PTV mental schemata when the low learning set instructions were administered. This effect failed to emerge when the high learning set was used.

Surprisingly, ratings reflecting the amount of mental effort subjects reported using while viewing the stimulus program varied little across the four treatment conditions. Mean scores for the treatment groups ranged from 4.00 to 4.71 on a 10 point scale, with a standard deviation for the sample as a whole of 2.15 (see Table 4). No trends are evident and no significant differences were produced. Thus, although the differences in learning outcomes for the low learning set CTV and PTV groups approached significance, the corresponding

reports of mental effort used while viewing the program fail to account for such differences. However, it should be noted that the mean mental effort ratings for CTV and PTV viewing in general were 3.14 for CTV and 5.50 for PTV, significantly different at $p < .001$ (see Table 5), again supporting hypothesis #1.

DISCUSSION

The primary purpose of this study was to empirically assess the degree to which the mental effort utilized in processing television content is related to the perceived demand characteristics associated with the programming content, and to examine the influence of the use of varying amounts of mental effort on learning outcomes which result from TV exposure.

The study firmly establishes that people report using different amounts of mental effort to process different types of television content, distinguished as public and commercial television programming. Apparently, people's expectations about the nature of the TV content typically provided by public broadcasting programming act to increase the amount of effort used (or at least perceived to be used) in processing such content, as compared to commercial television. This finding supports the initial hypothesis and corroborates previous research which indicates that public television programming is generally considered more intellectually demanding than commercial television content.

The observed interaction between the program-type and learning set variables indicates that different learning outcomes result from the two levels of the program-type manipu-

lation, but only when the low learning set instructions are utilized. This interaction suggests several important implications.

The low learning set conditions can be considered to represent most closely the viewing environment that people typically experience during everyday TV viewing. In this context, examination of learning scores indicates that the PTV group outperformed the CTV group, with the mean difference closely approaching significance. This result suggests that, under normal viewing circumstances:

1. Varying amounts of mental effort may be called upon to process what is perceived as differing types of TV content.
2. The amount of effort used in processing different types of TV content is a function of the perceived demand characteristics associated with the programming content.
3. Greater learning as a result of exposure to TV programming occurs when greater amounts of mental effort are invested in the processing of such programming content.

The fact that the learning posttest used in the study proved to be a relatively easy task (mean of 17.18 correct out of 20 items for all subjects) suggests that the variance across the experimental groups' learning scores was minimized. Even with this limitation, however, the differences in learning scores for the CTV and PTV groups approached significance, suggesting though not confirming that the second hypothesized relationship exists under normal viewing circumstances.

The high learning set conditions, however, produced markedly different learning outcomes. Posttest learning scores in this context revealed no difference between the CTV and PTV groups. This phenomenon seems best explained by the

existence of a ceiling effect which occurs as a result of the high learning set instructions, masking the differences in learning that otherwise would emerge given the CTV/PTV distinction.

The high learning set results need not be considered to diminish the significance of the previously discussed CTV/PTV learning differences in the low learning set conditions. While the low learning set conditions parallel natural viewing environments, the high learning set conditions reflect a more didactic context, wherein attempts would be made to maximize the learning outcomes which result from TV exposure. Thus, these results should be considered to reflect the outcomes that might result from such situations as the use of television programming in the classroom, or other formal instructional settings.

It was found that the level of mental effort reported for processing the stimulus program did not reflect the general trend of greater effort accompanying PTV. These ratings, however, were gathered subsequent to a feedback deception, in an attempt to assess the reciprocal nature of the relationship between reported mental effort and perceived sslf-efficacy. Thus, this design confounds the interpretation of these reports since the feedback deception, as well as all of the posttest measurements, intercedes between exposure to the program and subjects' mental effort reports. A mental effort measure gathered immediately after viewing the program and prior to any posttest measures would be necessary to directly tie increased learning outcomes to increased mental effort reports, and would certainly be suggested for any replication of research along these lines. However, even lacking this measure, the high degree of signif-

icance of differences between general measures of mental effort for processing CTV and PTV content suggests that greater levels of effort may actually have been implemented for processing the PTV content, accounting for the increased learning outcomes under the normal viewing condition.

In evaluating the mental effort reports, it must be emphasized that the measure is subject to the limitations of self-report data. It is interesting to note that when faced with the task of rating effort for commercial network and public television programming in general, subjects rated public television significantly higher, but that parallel differences did not emerge across the CTV/PTV manipulation in the experimental portion of the study. This outcome would call into question the validity of the general mental effort reports if the measure had been gathered immediately afted viewing the program material. However, the confounds previously noted, coupled with the high degree of significance of the general ratings, suggest that this inconsistency may not necessarily refute the validity of the more general mental effort reports.

A general summary of the results of this study can also be framed in terms of the theoretical model: PDC → mental effort → learning. Mental effort reports for commercial network and public television programming in general establish the link between PDC and mental effort rather strongly. However, the fact that mental effort ratings for the stimulus program do not parallel the trend of the general ratings suggests that further examination of this relationship is called for. Learning outcomes in the low learning set condition support the link between

mental effort and learning, though somewhat weakly. Learning differences did not emerge in the high learning set condition, probably as a result of the high learning set minimizing the PDC differences normally associated with the CTV/PTV distinction. Finally, mental effort reports gathered subsequent to the feedback deception provided no evidence of greater mental effort accompanying increased learning as was hypothesized. This result, however, may be attributable to shortcomings in the design of the study.

Although this study was conducted within the confines of a single medium, the results hold important implications for the study of the cognitive processing of communications content across different media. While the CTV/PTV distinction does not cut across media per se, it does examine the use of different approaches to information processing as a function of differing expectations associated with the context of the content in question, a crucial consideration in research exploring differences in the cognitive processing of content across media. If one accepts that the different program types in this study parallel the use of different media, at least insofar as they are likely to call into play different strategies for information processing, then this study may be considered a sibling of studies exploring media differences in learning effects.

In fact, one of the chief considerations in selecting the CTV/PTV manipualtion for the design of this experiment was to avoid the difficulties other studies have encountered in attempting to provide equivalent presentations when assessing cross media differences in the cognitive processing of communi-

cations content. Indeed, many studies have attempted to assess the influence of various media's forms of presentation by presenting equivalent content in different media and comparing learning outcomes which result from exposure. The difficulty with this approach is the problem of creating truly equivalent presentations across media. This approach necessitates separating form from content, which may artificially remove or diminish the unique characteristics of different media.

This study, on the other hand, avoids the difficulties associated with cross media comparisons, yet still allows for the examination of differences in the cognitive processing of communications content which are a function of the use of different mental schemata to handle the task. However, it must be noted that a different but related problem emerged in the selection of the stimulus program for this study. The experimental design requires a program that falls somewhere in the middle ground between people's perceptions of the type of material they would expect to see on both commercial and public TV. It is possible that this requirement may diminish some differences in the cognitive processing of the program that might normally occur given more representative examples of these two types of television programming. Indeed, this difficulty may account for the lack of differences across the CTV/PTV groups in subjects' mental effort reports for viewing the stimulus prog[illegible]

An alternative design would be to compare two separate pieces of program material, each more closely associated with commercial network and public television programming in general. This approach, however, would involve difficulties in equating

the two programs similar to the problems encountered in many cross media studies.

Aside from the implications for the study of cross media differences in learning, the results of this research also suggest that the learning potential of TV is, to a degree, dependent not only on the content it provides, but also on the context which frames the viewing situation. Of course, the demand characteristics which comprise the viewing context are liklely to be related to the viewer's past experiences with related content, and therefore not easily manipulable under normal circumstances. Thus, further research is called for to identify and examine other more easily manipulable factors which might influence the perceived demand characteristics of TV programming.

Further research in this area using children as subjects is also suggested. Since the perceived demand characteristics of media are framed by past experience, it would be especially interesting to conduct a study in this area sampling children of various ages and developmental levels. This approach would allow comparisons across age groups that could provide valuable information about the way in which perceived demand characteristics develop, and identify the point at which they become a factor in influencing media effects.

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Table 1

Comparison of Pretreatment Measures of Reported Mental Effort When Watching CTV & PTV Programming

	Mean	Std. Dev.	Std. Error	t Value	df	1-tail prob.
CTV	2.98	2.45	.32	4.64	56	<.001
PTV	4.35	2.45	.32			

n = 57

Table 2

Comparison of Learning Measures Across Experimental Conditions

Program Type	Learning Set Instructions: Low	Learning Set Instructions: High	Totals
CTV	16.38 3.20 21	17.28 1.78 18	16.79 2.65 39
PTV	17.81 2.50 21	17.24 2.74 25	17.50 2.62 46
Totals	17.10 2.93 42	17.26 2.36 43	mean std. dev. n

Table 3

Two-Way ANOVA Examining Influence of Program-type and Learning Set on Learning Outcomes

Source of Variation	MS	df	F	p
Main effects				
Program-type(PT)	10.17	1	1.46	.23
Learning Set(LS)	0.23	1	0.03	.86
Interaction				
PT x LS	11.27	1	1.62	.21
Residual	6.97	81		
Total	6.98	84		

Table 4

Mean Mental Effort Ratings After Experimental Treatment

Group	Mean	Std. Dev.	N
CTV	4.46	2.35	39
LOW LEARNING SET	4.71	2.59	21
Low feedback	4.50	2.46	10
High feedback	4.91	2.81	11
HIGH LEARNING SET	4.17	2.07	18
Low feedback	4.25	1.83	8
High feedback	4.10	2.33	10
PTV	4.09	1.98	46
LOW LEARNING SET	4.00	2.32	21
Low feedback	4.90	1.79	10
High feedback	3.18	2.52	11
HIGH LEARNING SET	4.16	1.68	25
Low feedback	3.92	1.68	12
High feedback	4.38	1.71	13
TOTAL	4.26	2.15	85

Table 5

Comparison of Posttreatment Measures of Reported Mental Effort When Watching CTV & PTV Programming

	Mean	Std. Dev.	Std. Error	t Value	df	1-tail prob.
CTV	3.14	2.21	.24	8.70	83	<.001
PTV	5.50	1.92	.21			

n = 84

Figure 1

Proposed Experimental Design

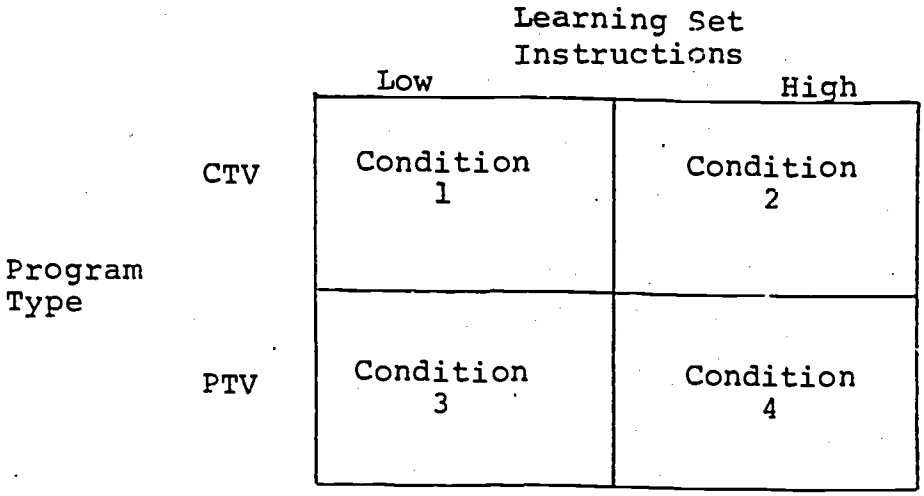

Figure 2

Interaction of Program-type and Learning Set

Influence on Learning Outcomes