Multiple Resource Theory and Consumer Processing of Broadcast Advertisements: An Involvement Perspective

Robert E. Smith and Laura M. Buchholz

In an attempt to reconcile past modality research, Leigh (1991) used Multiple Resource Theory while emphasizing the role of audio/visual congruency and task difficulty. This paper provides an alternative interpretation by reviewing Multiple Resource Theory from an involvement perspective. Past modality studies are organized and integrated based on the level of consumer involvement in the stimulus ad. Empirical findings are shown to be highly consistent with this approach. Suggestions for future modality research are presented.

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Introduction

Leigh (1991) has provided an interesting perspective on radio and TV ad processing using Wickens' (1984) multiple resource theory (MRT) as a conceptual basis. The purpose of this paper is to review MRT from an alternative perspective that focuses on consumer involvement and to offer a competing explanation of past modality research findings. Differences between the involvement perspective and Leigh's (1991) approach are developed and ideas for future research are identified.

Multiple Resource Theory of Attention

Background

Multiple resource theory as described by Wickens (1984) is based on the idea that multiple attentional resources exist and in some cases are separate from one another (i.e., can perform different attentional tasks at the same time without interference). An attentional resource is defined as the “inferred underlying commodity, of limited availability, that enables performance of a task” (Wickens 1984, p. 67). According to MRT, “there is more than one commodity in the human processing system that may be assigned resourcelike properties (allocation, flexibility, sharing),” (Wickens 1984, p. 78). Important relationships in MRT include:

1. To the extent that two tasks require separate attentional resources they will be time shared efficiently (i.e., without significant cross-task interference).
2. To the extent that two tasks require common attentional resources the performance on the tasks will depend on how resources are allocated to the tasks.
3. The difficulty of a task is increased when additional resources are needed for its performance. If two tasks fully use available common resources, increasing the difficulty of one task will hamper performance on a concurrent task. If two tasks use separate resources, increasing the difficulty of one task will not affect performance on a concurrent task.
4. Task priority determines how attentional resources are allocated, and plays the biggest role when tasks are difficult and share resources.
Separating Attentional Resources

Wickens (1984) uses three factors to identify attentional resources that are separate from one another: (1) the stage of processing, (2) the type of processing code, and (3) the modalities of input and response. These factors are graphically illustrated in Figure 1.

Stage of Processing. Wickens (1984) identifies three stages of attentional processing. First is perceptual encoding which represents the initial processing effort. This stage includes preliminary encoding such as preattentive processing, feature discrimination, etc. The second stage is defined as central processing and includes elaborative tasks like decision making, memory operations, and transulatory operations (Wickens 1984, p. 84). The third stage is response processing for making manual or vocal responses. Research indicates that perceptual encoding and central processing tasks use common resources while response processing uses separate resources (Figure 1).

Processing Codes. The processing codes, shown in Figure 1, are either spatial or verbal. Past research indicates that attentional processing of these codes relies on separate resources that may be anatomically related to right and left cerebral hemispheres (respectively).

Modalities of Input and Response. The input modalities, shown in Figure 1, are either auditory or visual (A/V). Research suggests that attentional processing of A/V stimuli relies on separate resources at the perceptual encoding stage. However, it is important to note that at the central processing stage (Figure 1) common resources may be used for processing A/V stimuli. Response modalities that rely on separate resources are manual or vocal reactions.

Applying Multiple Resource Theory to Advertising Research

According to Leigh's (1991) interpretation of MRT the primary sources of processing interference for TV ads are (1) the degree of A/V congruency and, (2) overall ad complexity. For low-involvement consumers, only limited encoding of ad points is expected to
occur. This favors TV since processing resources are not taxed, making cross-mode interference unlikely. For high-involvement consumers the effectiveness of encoding a TV ad will vary depending on the degree of A/V congruency. A TV ad that has congruent A/V components will "be encoded as a unified whole and without cross-modality interference." Therefore, it should have superior memory and cognitive response than a corresponding audio-only message. Incongruent A/V ads will produce significant cross-mode interference and thus less cognitive impact than a corresponding radio ad.

Leigh (1991) should be credited for his effort to apply MRT to media research. It is a very useful model for explaining and predicting attentional phenomena related to ad processing. However, as is usually true of complicated psychological theories, alternative interpretations and applications are possible. In an effort to foster debate and research on broadcast media processing, a different interpretation of MRT is presented that gives primary focus to the level of consumer involvement rather than the degree of A/V congruency.

An Involvement Based Interpretation of Multiple Resource Theory

The following interpretation highlights the role of consumer involvement because it directly impacts several important components of MRT: task priority, resource allocation, stage of processing, and overall task difficulty. By definition, involved consumers will give higher priority to processing brand/ad information because it is deemed personally relevant. According to Wickens (1984) this will cause more attentional resources to be allocated to ad processing tasks compared to low-involvement consumers who will allocate resources to other goals (e.g., thinking about program content). In addition, consumer involvement will affect the stage of processing since low-involvement consumers are unlikely to go beyond preliminary encoding while involved consumers will perform encoding and central processing tasks. This means high-involvement consumers perform more sophisticated and difficult processing tasks even though more attentional resources will be allocated to these tasks.

Modality Effects Under Low-Involvement

Due to low task priority, low-involvement consumers are unlikely to go beyond superficial encoding of brand/ad information. As shown in Figure 1, MRT states that separate attentional resources are available for visual and auditory input modes at the perceptual encoding stage. Since separate resources are used to process A/V stimuli, there should be little cross-modality interference for TV ads, especially since task difficulty is low. This suggests that the degree of congruency between A/V components will not play a significant role in determining cognitive response to TV ads under low-involvement conditions. Instead, TV ads should generate more cognitive response because A/V stimuli can be processed without cross-mode interference. This result can be predicted up to the point where all encoding resources are used and interference begins, though reaching this point seems unlikely for low-involvement consumers. Indeed, future research is needed to discover how much A/V stimuli low-involvement consumers can encode before cross-mode interference begins to occur.

Modality Effects Under High-Involvement

Structural Interference. High-involvement consumers can be expected to go beyond perceptual encoding of brand/ad information and perform a variety of central processing tasks like evaluating, organizing, and elaborating ad content (Buchholz and Smith 1991, Greenwal and Leavitt 1983, MacInnis and Jaworski 1989). Because central processing shares common resources with perceptual encoding (Figure 1), significant interference can occur if tasks at both stages require more attentional resources than are available. Because both stages of processing compete for the same attentional structures, conflict between encoding and elaborating tasks will be referred to as "structural interference." In this case, consumers must choose between processing more brand/ad elements at a superficial (encoding) level or processing fewer brand/ad elements at a deeper (central processing) level. If encoding and central processing tasks are relatively easy (e.g., few in number, familiar, simple, etc.), significant structural interference would not be expected since adequate resources could be allocated to both processing tasks. An important area for future research is to discover how much brand/ad information involved consumers can encode and elaborate in a 20 to 60 second TV commercial before attentional resources are depleted and structural interference begins.

Cross-mode Interference. In addition to the
possibility of structural interference, high-involvement consumers face a greater likelihood of cross-mode interference. This is because it is not yet clear whether the auditory and visual resources (which are separate at the encoding stage) retain their independence at the central processing stages reached by involved consumers. While Wickens (1984) feels more evidence is needed on this issue, he shows A/V components competing for common resources at the central processing stage (Figure 1). When attentional resources are shared for central processing of A/V stimuli, cross-mode interference will occur to the extent that task demands exceed available resources. Thus, central processing of TV ads for high-involvement consumers makes structural interference (between encoding and central processing tasks) and cross-mode interference (between audio and video processing) possible. MRT suggests that total task difficulty and resource allocation will ultimately determine how much structural and cross-mode interference occur.

**A/V Congruency.** In this respect, TV ads with incongruent A/V components clearly present a more difficult processing task since more information is presented. In those cases where significant structural interference exists and/or where the ad stimulus is complex, high A/V incongruity is likely to stress available resources and create cross-mode interference (similar to Leigh’s (1991) interpretation). In these situations TV ads can be expected to produce less cognitive impact than corresponding radio ads. However, if attentional resources are not strained (e.g., limited structural interference and easy to process A/V), an incongruent ad may not produce significant cross-mode interference if sufficient common resources are available. Here, incongruent A/V may actually increase the cognitive impact by providing more brand information. This possibility is very important to understanding the dynamics of TV ad processing but is not recognized in Leigh’s (1991) “congruency approach.”

**Empirical Support for the Involvement Perspective of MRT**

Reviewing past modality studies reveals support for the involvement interpretation of MRT as well as some disagreements with Leigh’s (1991) conclusions. Table 1 shows a summary of past research that compares radio and TV ads under high- or low-involvement settings.

**Low-Involvement Modality Effects**

Three modality studies have used exposure conditions that would create relatively low-involvement in processing ad information. Bryce and Olney (1988) embedded ads in 20 minutes of program material to induce a “low-involvement” message processing strategy. Results showed that a video-only format produced higher recognition than an audio-only format. However, this study “compared single channel visual-only messages with content redundant audio-only messages” (p. 176), so no data is reported on TV ads (i.e., audio plus video message). Therefore, contrary to Leigh’s (1991) conclusion, no evidence is provided from this study regarding the role of A/V congruency.

Edell and Keller (1989) instructed subjects to watch a TV newscast or listen to a radio newscast “as they normally do.” Target ads were embedded in 12 minutes of news programming and subjects were not alerted to them, thus creating a relatively low degree of ad involvement. This study manipulated the degree of A/V congruency by using audio that was specifically-related to the video (SRA) or only generally-related to the video (GRA). Leigh (1991) concludes that the differences between these treatments were not of sufficient magnitude to produce his predicted effects, but pretests conducted by Edell and Keller (1989, p. 154) showed “the SRA version of both ads was rated as having audio that was significantly more closely related to the video than was the audio in the GRA version of the ads, supporting the intended manipulation.” Results showed that subjects in the TV condition produced more cognitive responses for the incongruent ad than for the congruent ad. Moreover, TV produced higher recall of ad points than radio regardless of the level of A/V congruence. These results are consistent with the view that visual and auditory encoding tasks rely on separate resources, thus creating a TV superiority effect on cognitive impact. A/V incongruency increased cognitive responses and had no effects on recall.

Buchholz and Smith (1991) also included a low-involvement treatment condition validated by dependent measures. Results showed once again that TV produced more cognitive response and higher recognition of brand and ad points than radio. In addition, this effect was produced by an ad that Leigh (1991) considers to be incongruent since the A/V components were not strongly related. Thus, evidence from two studies supports the view that A/V incongruence need
Table 1
Summary of Modality Studies

<table>
<thead>
<tr>
<th>STUDY</th>
<th>MODALITIES</th>
<th>INVOLVEMENT</th>
<th>CONGRUENCY</th>
<th>RELATED FINDINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bryce and Olney (1988)</td>
<td>Audio-Only, Video-Only</td>
<td>Low</td>
<td>High</td>
<td>Exposure to video-only produced higher recall and recognition than audio-only.</td>
</tr>
<tr>
<td>Edell and Keller (1989)</td>
<td>Radio, TV</td>
<td>Low</td>
<td>High and Low</td>
<td>Incongruent TV ads produced more cognitive response than congruent TV ads. TV produced more recall and recognition than radio regardless of A/V Congruency.</td>
</tr>
<tr>
<td>Jacoby, Hoyer, and Zimmer (1983)</td>
<td>Radio, TV, Print (timed and untimed)</td>
<td>High</td>
<td>?</td>
<td>TV and radio ads produced equal comprehension, both less than print.</td>
</tr>
<tr>
<td>Klein (1981)</td>
<td>Radio, TV, Print</td>
<td>High</td>
<td>?</td>
<td>Radio and print produce higher immediate recall than TV.</td>
</tr>
<tr>
<td>Warshaw (1978)</td>
<td>TV, Audio-Only, Video-Only</td>
<td>High</td>
<td>High</td>
<td>Exposure to audio-only or video-only produced more recognition of A/V than exposure to TV.</td>
</tr>
<tr>
<td>Chaiken and Eagly (1976)</td>
<td>Audio-Only, Audio+Video</td>
<td>High</td>
<td>High</td>
<td>Directional pattern of audio visual producing more recall and recognition than audio-only for easy task, audio-only is better for difficult task.</td>
</tr>
<tr>
<td>Buchholz and Smith (1991)</td>
<td>Radio, TV</td>
<td>High and Low</td>
<td>Low</td>
<td>TV produced higher recognition than radio for low involvement, radio produced more elaborations than TV for high-involvement.</td>
</tr>
</tbody>
</table>

not be a detriment to cognitive response for low-involvement consumers. Indeed, when overall task difficulty is low and separate attentional resources are available, A/V incongruence seems to actually increase cognitive impact.

**High-Involvement Modality Effects**

Several past studies have used experimental conditions that would produce relatively high-involvement in processing the target ad. Warshaw (1978) asked subjects to watch or listen to a two-minute segment from *Happy Days* that included a 30-second test commercial. In addition to the instruction to watch or listen to the material, subjects were told they would be asked questions about it afterwards, thus creating a relatively high degree of involvement with the stimulus material. The TV ads were specifically de-
Even though TV subjects showed fewer elaborations, processing can be the basis for recognition of ad points. Importantly, there were 15 questions on audio content and 28 questions on video content, suggesting complex stimuli and high task difficulty. In this case it seems likely that processing a complex ad (plus any structural interference) depleted available resources causing significant cross-mode interference. Accordingly, it seems that A/V congruency is only one of several factors that affect overall task difficulty and may not be a reliable predictor of cognitive impact for TV ads by itself.

A study that examined processing task difficulty in more detail was Chaiken and Eagly (1976). This study did not use commercials but a seven minute speech about a company-union dispute that subjects watched closely. An “easy” message condition was differentiated from a “difficult” message condition by using fewer words per sentence, fewer clauses per sentence, and a less sophisticated vocabulary. The audio-video message was a tape of an actor delivering the message, while only the audio was used in the other treatment. Results showed that the easy message was better remembered by the audio-visual subjects than by audio-only subjects (3.24 to 3.05), while the difficult message was better remembered by the audio-only subjects (2.81 to 2.61). While these differences were not statistically significant, a similar pattern occurred for recall measures, with the easy message better remembered by audio-visual subjects (4.45 to 3.93) and the difficult message better remembered by audio-only subjects (3.71 to 3.36). Although this study did not use actual ads, its findings are consistent with the idea that high-involvement consumers can get more information from audio-visual stimuli if task difficulty is low, while cross-mode interference occurs as overall task difficulty increases.

Buchholz and Smith (1991) also included a high-involvement condition validated by dependent measures. Radio and TV subjects were alerted to the target ad and were asked to evaluate and elaborate its contents. Results showed that more central processing (in the form of personal connections) occurred in the radio condition, suggesting that TV subjects experienced significant cross-mode interference at this elaborative stage of processing. However, it is important to remember that both encoding and elaborative processing can be the basis for recognition of ad points. Even though TV subjects showed fewer elaborations, they should have processed the ad more effectively at the encoding stage since separate A/V resources are used. In this case, recognition of ad points should be equal for radio and TV ads since the advantages of TV at the encoding stage are offset by the advantages of radio at the elaborating stage. The findings reported by Buchholz and Smith (1991) are consistent with this view as TV and radio ads generated equal recognition scores when consumers were involved enough to perform both encoding and elaborating tasks.

Leigh (1991) suggests that if Buchholz and Smith (1991) had used recall instead of recognition measures, differences between TV and radio would have emerged for the high-involvement subjects. However, the rationale for this conclusion is not apparent, and past modality studies using both recognition and recall measures have found highly consistent results between the two (Bryce and Olney 1988, Chaiken and Eagly 1976). It seems more likely that TV would have generated higher recognition (or recall) if a simpler or more congruent TV ad had been used since this would have minimized cross-mode interference and enabled TV subjects to use more resources for elaboration. When consumers exposed to TV ads can perform elaborate processing to the same extent as radio subjects, TV should produce higher recognition scores due to its advantages at the encoding stage (where separate A/V resources are available).

The above analysis indicates that past research is largely consistent with the involvement perspective of MRT. Indeed, of the studies summarized in Table 1, none reports recognition or recall data that contradicts the predictions of this interpretation. However, the evidence does indicate that attentional processing can be quite dynamic, especially at high levels of consumer involvement. This makes predictions of single effects (like A/V congruency) difficult without knowing the level of other key variables. No doubt the complex nature of processing TV ads under conditions of high-involvement has been a major cause of the conflicting findings noted by Leigh (1991).

**Future Research**

In addition to the research recommendations of Leigh (1991), future tests of MRT need to address a variety of processing issues. First, under low-involvement conditions it is important to learn if task difficulty can reach levels that reduce TV's superior cognitive impact. It is well known that TV commercials shift visuals every 2-4 seconds to minimize consumer boredom. Can increasing stimulus complexity in this manner raise overall task difficulty to the
point where cross-mode interference occurs even when separate A/V resources are available?

Several questions regarding structural and cross-mode interference need empirically based answers. What combinations of encoding and elaborating tasks are possible for radio and TV ads before structural interference occurs? How much A/V information can high-involvement consumers process before cross-mode interference occurs? What is the functional relationship between structural and cross-mode interference, and to what extent is the relationship between these variables and brand recognition moderated by task difficulty? What other factors determine overall task difficulty beyond those already known (e.g., A/V congruency, amount of information, speed of delivery, etc.)?

Future research is also needed to investigate the effects of A/V congruency for TV ads. Valid and reliable methods for measuring A/V congruency are needed perhaps along the lines of Edell and Keller (1989). In addition, there is a need to discover under what conditions A/V incongruence creates significant cross-mode interference hampering cognitive response versus when it increases the attention value of the ad. The relationship between A/V congruency and other stimulus properties in determining overall task difficulty also needs investigation.

Finally, Leigh (1991) identifies the need to use a full range of memory-related responses to test ads, including cognitive responses, elaborative measures (like personal connections), and recall and recognition scores. In this regard, there is a pressing need to establish terms and measurement procedures that clearly identify and separate different forms of cognitive response. For example, Leigh (1991) suggests that cognitive responses like counterarguments represent a high level of elaboration, and this view is shared by Edell and Keller (1989). This perspective seems to be based on Petty and Cacioppo's (1986) Elaboration Likelihood Model where "elaboration" occurs when consumers diligently scrutinize message claims (and thus produce support or counterarguments). Other researchers (Buchholz and Smith 1991, Greenwald and Leavitt 1983, Krugman 1965, MacInnis and Jaworski 1989) indicate that agreeing or disagreeing with ad content is only a "middle level" evaluative process that is significantly different from elaborative processes like personal connections, auto-biographical thoughts, imagining the product in use, etc. Coding procedures are needed that will partition cognitive responses into meaningful categories that clearly separate encoding, evaluating, and elaborating processes. Developing such measures would greatly aid our ability to investigate and understand how consumers process radio and TV advertisements.

References


