

THE EFFECTS OF MULTITASKING AND MOOD ON AD MEMORY: IN THE CASE OF A
COMPETITIVE AD CONTEXT

BY

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THESIS

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Abstract

This study examines the effects of mood and multitasking on ad memory in a competitive advertising context. Previous studies have examined how mood triggered holistic and analytic processing styles, and how processing style interacted with multitasking to influence ad memory. However, no previous study had examined these interactive effects in a competitive ad context. The results showed that, while media multitasking had a detrimental effect on brand recognition, processing style that was triggered by mood did not affect ad memory. Furthermore, results showed that brand recognition for participants with a holistic processing style, which was induced by a positive mood, were less likely to be negatively affected by media multitasking when the number of tasks increased. This contrasted participants with an analytic processing style that was induced by a negative mood, who were more negatively affected by media multitasking when the number of tasks increased. Theoretical and practical implications are also discussed.

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CHAPTER 1

INTRODUCTION

Consumers these days are bombarded by an enormous amount of advertisements: commercials, billboards, direct mails, banner ads and pop-up ads, etc. All advertisements are competing for consumers' limited attention. In the United States, people are exposed to over 5000 commercial messages a day (New York Times, 2007), more than half of magazines and newspapers are devoted to advertising (Lee, 2007), and there are more than 935 million websites in 2015 (the Atlantic, 2015). From 2014 to 2015, annual online revenue generated by advertising has increased by 20.4%, from \$49.5 billion to \$59.6 billion (IAB, 2016). Mobile advertising revenue grew from \$0.6 billion in 2010 to \$20 billion in 2015 (IAB, 2015). Total monthly mobile ad views increased from 212,860 to 284,862, by 34%. Expenditure on television ads and internet advertising is expected to increase by 2.5% and 13.9% (Warc, 2013). Video ad views rose 47% from 2011 to 2012, which is more than double the growth rate of the previous year, which reached 23% (IAB, 2014). The modern media environment is indeed saturated. Not only is there more advertising than ever, but media multitasking has also become an increasingly popular trend amongst consumers. According to Nielsen (2010), there has been a 35% increase in media multitasking. The most popular simultaneous media multitasking activity is watching TV while browsing the internet: nearly 43% of interviewees said they regularly combine TV viewing and going online (IAB, 2015). TV and online multitasking is the norm for young media consumers, with 90% of them regularly consuming TV content and online content at the same time (IAB, 2015). Adults above 18 spent 27% more time on their computer and their mobile devices in 2015 compared with 2013 (Nielsen, 2015). People spend an average of 109 minutes

using multiple screens at the same time (Brown, 2014), these uses include: using a computer while watching TV, internet browsing while using mobile applications, and using a computer while listening to radio. 90% of tablet users engage in media multitasking while using their tablets. Multitasking is especially common amongst younger individuals, who multitask 44% of the total time when they are using their tablets (Moses, 2012).

These growing trends of competitive advertising saturation and media multitasking raise questions of whether their interaction might affect advertising effectiveness (Wakolbinger, Denk, & Oberecker, 2009; Jeong & Hwang, 2012). Individual differences in multitasking (Duff, Yoon, Wang, & Anghelcev, 2014), recall memory (Shapiro & Krishnan, 2001), frequency of media switching (Brasel & Gips, 2011), etc., were studied as predictors to assess the effects of media multitasking on advertising effectiveness. Many researchers have looked into different aspects of media multitasking and found conflicting results. On one hand, the results of some studies have shown that media multitasking can damage the effectiveness of advertising as it reduces the cognitive capacity allotted to a single task (Ophir, 2009). Due to competition for limited cognitive resources, an increase in task complexity causes interference with the effortful processing of mediated messages (Bone & Ellen, 1992). When a secondary task becomes cognitively demanding, the bottleneck effect takes place, and a participant's explicit memory of media content depreciates (Shapiro & Krishnan, 2001). On the other hand, the results of some studies have suggested that media multitasking may not always be bad for ad memory. For example, competition over limited processing resources may lead to lowered encoding of media content (Zhang, Jeong, & Fishbein, 2010) and less counter arguing (Jeong & Hwang, 2012), causing consumers to make higher evaluations of the ads. Media multitasking can also alleviate boredom and thereby decreases the likelihood of losing focus (Andrade, 2010). Voorveld (2011) suggested that simultaneous consumption of online and radio advertising could lead to more

overall positive responses to the ads.

Unlike the effects of media multitasking on individual memory, a considerable amount of research indicates that a competitive ad context can lead to memory interference (Chunovic, 2003; Lafayette, 2004). A competitive ad context is defined as the presence of multiple ads for brands in the same product category (Malaviya et al., 1996). A competitive ad context may make it difficult for consumers to distinguish between ads at a later date (Keller 1987). According to previous studies, competitive ad environments are one of the primary reasons for decreased advertising effectiveness (Malaviya et al., 1996). While brand information needs to be retained for consumers to access when making decisions about product purchasing, the similarity of brands in a competitive ad context creates additional information that is encoded at the same time (Melton & Irwin, 1940), making it difficult for consumers to recall the relevant information of the advertised brand (Biehal & Chakravarti, 1986; Keller, 1993).

Another factor that is known to affect ad memory is mood. Previous studies have shown that mood can influence an individual's information processing style (Schwarz & Clore, 1990; Forgas, 1995). Extensive evidence in psychology suggests that an individual's mood state can affect search strategies (Förster & Higgins, 2005; Gasper, 2004). A recent study by Duff and Sar (2015) found that mood could induce holistic and analytic processing styles that interacted with media multitasking to influence an individual's memory of ads. Specifically, they found that a positive mood induced a holistic processing style, while a negative mood induced an analytic processing style. A holistic processing style encourages breadth in perceptual processing, prompting individuals to pay attention to a larger scope of information rather than "zooming in" on small details. An analytic processing style encourages narrow processing by filtering out

information in the peripheral and maintaining a smaller focus. These processing styles could interact with media multitasking to influence ad memory.

While many studies examined how mood, multitasking, and competitive advertising context affect memory individually, only a few studies have examined how all of these factors interact with each other to influence ad memory. Theoretically, it is crucial to build on previous studies by Sar, Nan and Myers (2010), and Duff and Sar (2015) to understand how these variables interact with each other to influence ad memory. By studying the interaction of mood, multitasking, and competitive ad contexts, it is possible to create a more realistic daily media consumption scenario as well as glimpse valuable insights for advertising professionals who want to increase their advertising effectiveness in the modern media environment. According to Sar, Nan and Myers (2010), processing styles that were induced by mood could interact with ad context to influence ad memory, hence changing the amount of successful recall of advertising claims as well as evaluations of advertisements. By examining the interaction of these variables in one study, theoretically, this study could provide a better understanding of how mood, multitasking, and competitive ad context interact to influence ad memory. Practically, this study could help advertising and media professionals to make more informed decisions, most notably on online advertising platforms.

As such, this thesis seeks to examine the interactive effects of mood and multitasking in a competitive context. In the following section, I will discuss media multitasking, mood, and competitive ad contexts, as well as their interactive effects on recall and recognition of the advertised brands.

CHAPTER 2

LITERATURE REVIEW

2.1 Summary of Research in Multitasking and Attention

Media multitasking is defined as consumers using “more than one media system or approach at a single point in time” (Pilotta et al., 2004), or as “consumers engaging in two or more information-processing tasks at the same time” (Koolstra, Ritterfeld, & Vorderer, 2009).

There are many studies that examine what kind of factors can affect media multitasking performance. Most studies have focused on how media multitasking can affect learning, memory, and cognitive processing (Armstrong & Chung, 2000; Brasel & Gips, 2011; Pool, Koolstra, & van der Voort, 2003). Some have looked into individual differences in media multitasking preferences. Ophir et al. (2009) indicate that heavy media multitaskers (HMM) and light media multitaskers (LMM) have very different processing styles. HMMs have a harder time separating irrelevant information from its environment and are less likely to ignore that information, while LMMs are more likely to adopt a top-down attentional control, and find it easier to focus on a single task in the face of distractions. While some researchers argue that media multitasking may disrupt information comprehension and recall (Armstrong & Chung, 2000; Zhang, Jeong, & Fishbein, 2010; Jeong & Hwang, 2012), others argue that media multitasking isn't always a negative factor when it comes to advertising. For example, media multitasking reduces an individual's ability to think of information critically while improving overall information evaluation (Baron, Baron, & Miller, 1973; Gilbert, Tafarodi, & Malone, 1993), thus making consumers less likely to think of counter-arguments to advertising claims and leading to a more positive outlook on advertisements.

One of the most prominent psychological models of multitasking performance is the bottleneck theory. According to Pashler (1998), in contrast with previous psychological studies, which suggest that a human's ability to multitask is limited by their cognitive capacity, the cognitive process of attention should be divided into three categories: pre-central processing (perception), central processing (executive control and response generation) and post-central processing (execution). Central processing includes decision-making, memory storage, and memory retrieval. Pashler suggests that perceptual machinery is capable of identifying multiple stimuli when each stimulus load was light. Unlike cognitively demanding tasks that can only be processed one by one, perceptual tasks can be processed simultaneously. The bottleneck theory proves that it is possible for individuals to process several different perceptual stimuli simultaneously. Regarding perceptual load, Lavie (1995) suggests that, different from a cognitive load, while perception has its limited capacity, it processes automatically all the perceived information within its capacity. When the perceptual load is high, the capacity is fully used thus no attention is paid to unattended information. When perceptual load is low, however, every stimulus is processed automatically regardless if it is irrelevant to the central task.

When it comes to advertising, media researchers usually use memory, ad message comprehension, and ad evaluation as measures of dependent variables to track the effects of media multitasking on these outcome variables. With a heavy load during media multitasking, encoding of media might be influenced negatively (Zhang, Jeong, & Fishbein, 2010). Due to competition for limited attention, an increase in task complexity leads to interference with effortful processing of mediated messages (Bone & Ellen, 1992). When a secondary task is cognitively demanding, the bottleneck effect takes place, and an individual's explicit memory of media content depreciates (Shapiro & Krishnan, 2001). Voorveld (2011) studied the effects of media multitasking on advertising effectiveness, focusing on the combination of online and radio

advertising. Results from their study show that diminished cognitive processing during media multitasking results in lower rates of recall and recognition for advertising stimuli. Based on these studies, it is reasonable to suggest that consumers who media multitask will perform worse on a recall/recognition tasks compared with consumers who do not media multitask. Wang et al. (2012) found that media multitasking which combines internet browsing with audio-visual TV programming achieves lower behavioral and visual attention performance compared with combining internet use with audio content. This is because, when both tasks are visual, media multitasking has placed higher cognitive demands on an individual. Performance cost is lower when media multitasking is split between audio and visual channels as a result of its lower demands on an individual's cognitive processing. Notably, if media content requires less interaction, it is less cognitively demanding.

The above discussion indicates that media multitasking can affect memory of advertising by changing the amount of attention directed at the stimulus. However, media multitasking is not the only factor that can potentially affect advertising effectiveness. Consumers are bombarded with a huge amount of information on a daily basis, which might leave them less likely to remember advertised brands, and more likely to confuse the target brand with other brands. It is necessary to look at how media multitasking and competitive ad contexts can interact to affect individual memory.

2.2 The Joint Effect of Multitasking and Competitive Ad Context

The growing number of advertisements in a competitive context is one of the most researched topics in recent advertising literature (Malaviya et al., 1996; Jewell & Unnava, 2003; Kumar & Krishnan, 2004). Several studies on the effects of ad context on ad memory showed that competing ads in the viewing environment caused memory interference (Malaviya et al.,

1996; Chunovic, 2003; Lafayette, 2004) on TV commercials, for example, TV viewers may tune out many ads in a cluttered media environment (Kent, 1993). In a laboratory study of television advertising, Webb (1979) reported significant negative effects on ad attention and brand recall with each successive ad during a period of exposure. Increases in the number of ads shown in an individual's ad environment lead to a decrease in brand recall accuracy (Keller, 1991; Pillai, 1990). The psychological explanation for interference is that, when brands in the same category are advertised together, consumers may find it difficult to remember which ad is associated with which brand in the category. Thus, unconnected ad memory may be mistakenly connected as a result (Jewell & Unnava, 2003). According to the associative network model, a model which represents the organization of brand information in memory, brands are structured as a network of interconnected nodes. A competitive ad context impairs an individual's ability to remember a brand shown previously as other brand information competes with retrieval of the target information (Anderson & Neely, 1996).

There are other factors that can affect the amount of memory interference caused by competitive advertising context. Studies have shown that similarity, ad exposure interval, ad repetition, brand familiarity, and consumers' prior knowledge can interact with ad context to affect the amount of ad memory or ad evaluation (Burke & Srull, 1988; Danaher, Bonfrer, & Dhar, 2008; Keller, 1987, 1991; Kumar, 2000; Kumar & Krishnan, 2004). Ad exposure interval is a factor that is negatively correlated with ad memory in a competitive ad context. Studies have suggested that, as the time interval between the repeated presentations of the same stimulus increased, memory for the repeated item increased at a diminishing rate (Sawyer, Noel, & Janiszewski, 2009). Another important factor is ad repetition. In a competitive ad context, greater overall ad exposure is necessary for consumers to remember the target ad compared to in a non-competitive ad context (Cacioppo & Petty, 1979). In general, ad repetition is positively

correlated with ad recall (Ray & Sawyer, 1971). Ad similarity is also a frequently studied factor in a competitive ad context. Ad similarity is a relative factor which depends on other stimuli that are presented together with the target stimulus (Jacoby & Craik, 1979). Furthermore, in the context of a competitive ad environment, the distinctiveness of the target ad positively affects its retrievability and resistance to interference (Moscovitch & Craik, 1976). Competitive ad contexts also interact with consumer knowledge to affect an individual's memory and ability to retrieve relevant information from advertisements. A competitive ad context increases memory and evaluation when consumer product knowledge is low because it helps consumers compare different products more readily. When consumers have a high level of product knowledge, their memory is less likely to be affected by ad context (Lee & Lee, 2011).

There are two types of ad contexts according to previous studies: a competitive ad context and a non-competitive ad context. A non-competitive ad context is defined as when an ad is shown amongst other ads in different product categories (Burke & Srull, 1988; Kent & Allen, 1994). A competitive ad context, on the other hand, is defined as when an ad is shown amongst other ads for brands in the same product category (Sar, Nan, & Myers, 2010), as was previously mentioned. In a competitive ad context, an ad for the target brand is presented along with ads for competing brands in the same media vehicle. For example, Kent (1995) documented that in daytime network television between 19% and 29% of advertisements have a competitive commercial, with brands in the same categories aired on the same channel within a short period. Other researchers used print ad or radio ad to study the effects of competitive ad contexts ((D'Souza & Rao, 1995), ultimately finding that, when exposed to ads voluntarily in a competitive ad context, consumers' wear-out effect may only begin after many more exposures.

The focus of most studies on ad clutter has been to understand the memory interference caused by competitive ad context (Keller, 1987, 1991; Kent, 1993; Kumar & Krishnan, 2004). In a competitive advertising context, relatively weak associations are formed between brands and their ad memory so that some communication facts in the product category cannot be recalled (Keller, 1991). If two brands are advertised in the same product category and subsequently stored close together in memory, consumers may also have difficulty distinguishing which ad corresponded to which brand (Keller, 1987), detrimentally impacting the communication effectiveness of the target brand. Given that both competitive ad interference and media-multitasking is known to harm consumers' ad memory performance, we can postulate that:

Hypothesis 1: Recall and recognition of the advertised brands will decrease for those who engage in media multitasking (two and three media tasks) as compared to those who engage in a single media task.

Although some studies have found that media-multitasking can affect brand evaluation in a positive way (e.g. by reducing a consumer's likelihood of positing counter-arguments) (Jeong & Hwang, 2012) and alleviating boredom (Hembrooke & Gay, 2003). A greater number of studies suggest that a negative relationship exists between media multitasking and ad memory. Similarly, a competitive ad context may create a higher level of interference compared with a non-competitive ad context (Rossiter & Percy, 1985). Media multitasking and competitive ad contexts are perceptually demanding conditions. Both factors can take up a large part of individuals' attention resource and create interference between different sources of information. Considering the combined impact of both conditions, it is reasonable to postulate the above hypothesis.

While the detrimental effects of media multitasking and competitive ad context on memory are well studied, many studies have shown that other factors that can alter how much consumers are affected by these conditions, and that can change their ability to retrieve the encoded information. For example, a recent study by Duff and Sar (2015) found that processing styles that were induced by mood could interact with media multitasking to affect an individual's ad memory. The following part of the thesis will examine literature related to processing styles and mood to further assess their influence on ad memory.

2.3 Summary of Research in Mood and Processing Style

2.3.1 Processing Style

According to Tulving and Schacter (1990), processing styles are “content-free ways of perceiving the world and are represented in procedural memory”. Many researchers have studied the psychological processes that affect both perceptual and conceptual processing styles, showing that there are individual, situational, affective, developmental, and cultural influences (Förster & Dannenberg, 2010). Meyer and Kieras (1997) suggest that processing styles are subject to learned strategic adjustments such that perceptual processing capacity can be significantly altered. For example, culture is one such factor that promotes changes in an individual's processing style. Ueda and Komiya (2012) found that people from East Asia were more likely to have a broader scope of foci when they were doing visual searching tasks with multiple objects compared with Westerners. East Asians also had a preference for information-rich media content compared with Westerners. Processing styles can be transferred from one task to another unrelated task. For example, using an analytical processing style may activate *procedural priming*, which is the phenomenon of processing styles being carried over to other, unrelated tasks, without an individual's awareness, ultimately facilitating an individual's ability

to solve similar problems (Förster & Dannenberg, 2010).

There are two kinds of processing styles, analytic processing style and holistic processing style. Analytic processing is processing that focuses on specific items (Schwarz, 1990). Analytic processing promotes detachment of an object from its context. People with an analytic processing style are more likely to focus on specific objects and hence remember them. Previous studies have shown that individuals with an analytic processing style: preferred visual environments that were less saturated with information (Wang et al., 2012); showed more concentrated eye movements on individual items (Masuda & Nisbett, 2001); and evaluated stimuli using a bottom-up logic (perceiving stimuli by starting with the smaller details of that stimuli and then building the whole picture of it, e.g. seeing the tree before the forest) rather than top-down logic (forming perceptions with larger objects, concept or idea before moving to more detailed information, e.g. seeing the forest before trees) (Navon, 1977).

People who use holistic processing styles, on the other hand, are more likely to focus on the relationships between objects and backgrounds; individuals with a holistic processing style tend to orient their attention towards the context as a whole (Nisbett et al., 2001). Holistic processing styles facilitate broader perpetual processing in a complex environment at the expense of encoding fewer details of specific items (Srinivasan et al., 2009). Previous studies have shown that people with a holistic processing style are more likely to adapt a broad visual search (Goh, Tan, and Park 2009), typically favor complex, information-rich visual environments (Masuda et al., 2008; Wang et al., 2012), and pay more attention to the broad field than any particular objects. Navon (1977) conducted an experiment illustrating that, when presented with a large letter made up of smaller letters, participants who had adopted a holistic processing style recognized the larger letter before they noticed the smaller letters. In 2001, Masuda and Nisbett

presented animated scenes of fish in front of an underwater background to Japanese (who are more likely to adopt a holistic processing style) and Americans (who are more likely to adopt an analytic processing style) and asked them to report what they had seen. Americans usually referred to the focal fish whereas Japanese typically referred to background elements.

While mainstream advertising research focuses on contrasts between different conceptual processing styles (Monga, Roedde & John, 2008, 2010; Okazaki, Mueller, & Dihl, 2013), this paper focuses on the perceptual aspect of analytic and holistic processing styles, and on the factors that might change an individual's processing style. Perceptual processing is the bottom-up processing of sensory impressions and perceptual characteristics, such as shapes, colors, and forms. Perceptual processing is usually associated with implicit memory (Lyttle, Dorahy, Hanna, & Huntjens, 2010). Conceptual processing, on the other hand, is a top-down processing style, which is considerably more cognitively demanding. Conceptual processing happens during elaboration and organization of memory (Lyttle, Dorahy, Hanna, & Huntjens, 2010). As mentioned earlier, perceptual load decides if non-attentional (peripheral) information is processed during media multitasking. Perceptual load can be manipulated by the number of items appeared within the attention area. When the perceptual load is high, individuals will not be able to attend to peripheral information. When the perceptual load is low, information will be processed automatically.

According to previous studies, processing styles can be induced by mood, where a negative mood leads to more analytic processing while a positive mood leads to more holistic processing (Gasper, 2004; Förster & Higgins, 2005; Schwarz & Clore, 1983). The following section will review related studies on the interaction between mood, processing style, and ad memory.

2.3.2 Mood and Processing Style

Mood is conceptualized as “a diffuse and generalized form of affect experienced at low to mild intensity levels, which can range on a continuum of positive to negative valence” (Clore, 1992; Clore, et al., 2001). Mood has two characteristics: valence (positive, neutral or negative) and intensity of arousal (Gardner, 1985). Mood can be either a dispositional state or a manipulated mood state. Both types of mood (dispositional and manipulated mood) can last from minutes to hours (Mitchell & Phillips, 2007). Emotion is different from mood in its intensity, attention-getting, and ability to induce specific behaviors (Clark & Isen, 1982). While people might be aware of their emotions, they do not necessarily notice their mood or its effects (Clark & Isen, 1982).

Mood can influence affective, cognitive and behavioral responses to many different objects (Luomala & Laaksonen, 2000). Individuals might evaluate objects, persons, and events more positively under a positive mood or negatively under a negative mood (Clore, Schwarz, & Conway, 1994; Forgas, 1995; Schwarz, 1990). Some researchers argue that positive mood can lead to limited processing capacity (Mackie & Worth, 1989). These studies have shown that people in a positive mood were more likely to depend on heuristic strategies rather than systematic processing strategies (Melton, 1995). Those in a positive mood tended to use more holistic processing strategies and succumbed more frequently to fundamental attribution errors (Forgas, 1998), ultimately showing greater intergroup discrimination in personally irrelevant situations (Forgas & Fielder, 1996), relying on stereotypes (Bodenhausen, Kramer, & Susser, 1994), and following schemas (Gasper & Clore, 2002). Those in a negative mood, on the other hand, tended to employ more analytic processing strategies, paying more attention to minute details (Clore et al., 1994). Based on mood maintenance motivation theory, people in a positive

mood will avoid exerting effort on a cognitively demanding task unless that task will maintain or promote their positive mood (Isen, 1987; Wegener, Petty, & Smith, 1995). However, positive mood does not necessarily mean reduced processing. According to Isen (1987), people in a positive mood outperformed those in a neutral or negative mood when it came to creativity and problem-solving tasks. Positive mood also improved individuals' ability to consider unmentioned categorization possibilities and relational elaboration (Estrada, Isen, & Young, 1997).

The most prominent theories in mood literature and information processing is the affect-as-information model (Schwarz, 1990). This model postulates that feelings are a source of information and different kinds of feelings convey different types of information. The theory predicts that a negative mood informs people that the situation is problematic and that people should pay attention to incoming information to understand the situation. This bottom-up processing style leads people to focus on details. The theory also states that a positive mood informs an individual that a situation is benign. Benign feelings of a positive mood about environmental cues prompted individuals to adopt a top-down processing style. Positive moods signal to individuals that their environment is safe (Bless et al., 1996; Schwarz & Clore, 1983), allowing them to have a broader view of stimuli, taking on a holistic processing approach (Beukeboom & Semin, 2006). People with negative mood, on the other hand, are more likely to adopt an analytic processing style, paying close attention to specific information (Clore, Schwarz, & Conway, 1994) and processing information more thoroughly (Sinclair & Marks, 1992). Negative mood can lead people to narrow that scope and adopt an item-specific processing style, the type of processing style that “focuses on [specific] attributes of the objects” (Sinclair & Marks, 1992). As a result of narrowing the scope of stimuli that they delegate focus to, people in a negative mood do not pay as much attention to peripheral stimuli as people

in a positive mood (Srinivasan et al., 2009). The view that a positive mood encourages individuals to utilize holistic processing is consistent with mood maintenance motivation theory. According to this theory, people in a positive mood will avoid exerting effort to process incoming information in detail unless that detailed processing of information will help to maintain or promote their positive mood (Isen, 1987; Wegener, Petty, & Smith, 1995).

Many researchers have examined how mood can affect advertisement effectiveness (Clore et al., 2001; Fiedler et al., 2003; Storbeck & Clore, 2005). Bakamitsos and Siomkos (2004) suggested that mood might affect advertising effectiveness directly as well as indirectly. On one hand, mood can act as a piece of information which helps people to evaluate their situation, thereby affecting retrieval of brand information, evaluation of marketing materials (Gardner, 1985), and decision-making behavior (Isen & Means, 1983). When mood was used as a piece of information, consumers tended to interpret it as a heuristic cue in order to render a judgment. They found that consumers who were in a positive mood were more likely to have a positive evaluation of the exposed product compared to consumers in a negative mood. Gardner (1985) also found that mood could increase an individual's ability to recall information that was consistent with said mood. This phenomenon is called the mood congruity effect (Bower, 1981). According to Bower (1981), the mood congruity effect is the phenomenon of facilitation of information processing when the mood (positive/negative) of the material is congruent with participants' on-going moods. The psychological explanation for the mood congruity effect is that, when exposed to emotional information, a mood state was bounded with that mood-congruous material and cognitive semantic association was established. As a result, an associated mood state would facilitate the recall of that mood-congruous cognitive material.

On the other hand, mood can affect advertising effectiveness indirectly by affecting an individual's information processing style, thus influencing product memory and evaluation. Positive moods increased efficiency of information processing (Isen, 1985) and facilitated relational elaboration (Schwarz, 1990). Individuals in a happy mood tended to process information with a holistic style, in which they conceptualize several stimuli as a whole (Fredrickson, 1998). Positive mood also improved an individual's ability to generate relationships between different objects. Consequently, happy people are better at categorizing information in a more flexible manner (Murray et al., 1990) and exhibit superior brand name learning (Lee & Sternthal, 1999) as a result of a wider breadth of attention.

2.3.3 Interaction of Processing Style and Media Multitasking in a Competitive Ad Context

While it is important to understand the effects of a competitive context on ad memory, no study has examined how memory interference can be further exacerbated by its interactions with mood and media multitasking, simulating a realistic ad viewing environment. It is important to study how these factors work together in to determine the most effective way to maximize consumer memory of exposed brands in a fiercely competitive context. Under a competitive advertising context, Individuals with an analytic processing style are more likely to focus on specific items and detach specific ads from their context. An analytic processor tends o focus on the unique attribute of products. In contrast, a holistic processor is more likely to categorize larger groups of information together based on their shared feature. According to Isen and Daubman (1984), individuals with a holistic processing style are more likely to categorize with a wider breath, e.g. include camel under the category “vehicles”, compared with individuals with an analytic processing style. Under a competitive ad context, Individuals with a holistic processing style are more likely to categorize a bigger group of products together compared to

those with an analytic processing style. According to a study by Duff and Sar (2015), when placing commercials with a single, simple, perceptual task together on the same screen, participants who had a holistic processing style that was induced by a positive mood had a better memory of the exposed ads compared with participants who had an analytic processing style that was induced by a negative mood. Based on the affect-as-information model and previous studies, it is reasonable to assume that, even under a competitive ad context, participants who are in a positive mood will have a better memory of the ads compared with participants in a negative mood. A positive mood facilitates holistic processing that allows people to see relationships between the advertised brands even when those brands are placed in a competitive ad context (Schwarz, 1990). Consumers who encounter a competitive ad context where ads that are both similar to each other and placed at the peripheral of magazines or web pages must process various sources of information simultaneously. Combining media-multitasking with a competitive ad context creates a more complex, information-rich environment, which is typically favored by people with a holistic processing style. Thus, we postulate that:

Hypothesis 2: Recall and recognition of advertised brands will not be negatively affected for people who use holistic processing style that was induced by a positive mood as compared to people who use an analytic processing that was induced by a negative when performing media multitasking (two and three media tasks).

CHAPTER 3

METHODOLOGY

3.1 Participants

One hundred and twenty-three participants (N = 123) from the advertising research subject pool of University of Illinois at Urbana-Champaign participated in the main experiment. Students who participated in the main experiment were given extra credit for their participation. The experiment was a 3 (multitasking: one, two and three tasks) x 2 (mood: positive and negative) design. Participants were randomly assigned to different experimental conditions and treatments (See table 1).

Table 1			
<i>Experimental condition and treatment</i>			
Positive Mood (Holistic Processing Style)	N = 20	N = 19	N =21
Negative Mood (Analytic Processing Style)	N = 20	N = 20	N = 22

The demographic of participants were comprised of (N = 93) female students and (N=35) male students. Amongst them (N=82) were Caucasians, (N = 7) were African Americans, (N = 32) were Asians and (N = 6) were Hispanics. The final number of participants who were included in the analyses was 123. Four participants were removed due to violation of instructions.

3.2 Experimental Procedures

When participants arrived at the computer lab, they were welcomed by the researcher. They were asked to read an informed consent form and sign it before they were randomly

assigned into experimental conditions and treatments. Once participants signed an informed consent form they were told that they would need to participate in two parts of an experiment in order to receive an extra credit for their participation. They were told that the first part of the experiment consisted of writing a short story that would be used for a future study (in fact, a disguised mood manipulation procedure; Forgas 1994 and 1995; Johnson & Tversky 1983). Also, they were told that the second part of the experiment involved evaluating a website (see the main experiment for detail).

3.3 Mood Manipulation and Procedure

After participants had signed an informed consent form, they were randomly assigned to a different mood condition. In order to induce participants' mood states, participants were instructed to answer two open-ended questions. They were asked to answer the questions as truthfully as possible and provide as much detail as possible. Participants who were assigned to a negative mood condition were instructed to make sure their answer should be as negative as possible so that people who read them will also feel negative whereas participants who were assigned to a positive mood condition were instructed to make sure their answer should be as positive as possible so that people who read them will also feel positive. The first question asked participants to describe five events/situations that made them most (un)happy. The second question asked participants to describe in more detail two events/situations that made them, or had made them, the most (un)happy. Participants later completed the mood self-report questions on the same questionnaire in which they rated the extent to which they felt a certain mood at that moment that was anchored by sad/happy, bad/good mood, unpleasant/pleasant, and gloomy/cheerful, with one meaning "most negative" and seven meaning "most positive." Two questions regarding arousal were also included in the mood self-report questions, anchored by

“quiet/aroused” and “still/stimulated.” This mood manipulation was previously used in studies by Forgas (1994 and 1995) and Johnson and Tversky (1983).

Mood state was checked after the mood induction manipulation. To measure participant’s mood state, they were asked to rate on six items using seven-point scales that were anchored by sad/happy, bad/good mood, unpleasant/pleasant, gloomy/cheerful with 1 meaning “most negative” and 7 meaning “most positive.” Arousal was also measured using two seven-point scale items anchored by quiet/aroused, and still/stimulated.

After finishing the first part of the study (mood manipulation), the researcher collected the first set of questionnaire before they were instructed to do the second part of the study. After they had finished with the first part of the study, participants were randomly assigned to a different experimental treatment (i.e., one task, two tasks, and three tasks). Participants were then verbally instructed to browse through a web page on the desktop. The web page was shown on Internet Explorer. Participants were instructed to read an article on the web page about geography (see reading comprehension task below for detail) as carefully as possible because they would be asked to evaluate the web page and a reading comprehension later. Participants in the one-task group were instructed to read only the paragraph on the webpage. Participants in the two-task group were instructed to read the webpage, and watch a documentary video clip about trains with no sound. The video clip was played on a 9.5 inch iPad placed in front of them. They were instructed to pay attention to both tasks equally and simultaneously. The participants in the three-task group were instructed to read the webpage, watch a documentary video clip about trains with no sound--the video was played on a 9.5 inch iPad placed in front of them--and at the same time listened to a clip of audiobook about basic economics on the computer using headphones. They were instructed at the beginning of the experiment to pay attention to all tasks

equally and simultaneously. After finishing their tasks, all participants were handed the second questionnaire that included questions about whether they paid equal and simultaneous attention to all tasks. The questions are as follows: first, they were asked five questions as a reading comprehension test; second, they were asked to answer a question related to ad recall (to write down as many brand names they can remember from the website); third, they were shown eight brands and asked to circle the brand logos that appeared on the website (see measurement section for detail); fourth, they were asked to answer 24 questions using the AHS test on a seven-point scale (Choi, Koo, & Choi, 2007) as processing style check. *Analysis-Holism Scale* (AHS) is used to measure analytic versus holistic thinking tendency for between-culture and within-culture comparison. It is a 24-item scale that includes four constructs as the key characteristics of analytic-holistic processing style: attention (field/parts), causality (interactionism/dispositionism), perception of change (cyclic/Linear), Contradiction (naive dialecticism/formal logic). AHS treats analytic and holistic processing as two ends of a single dimension. It has been tested to demonstrate reliability and validity (Choi, Koo, & Choi, 2007). Finally, they were asked to answer questions related to basic demographic information.

3.4 Stimuli and a Competitive Ad Context

Eight fictitious brands for tablets were created, and participants were presented with eight tablet pictures. All tablet pictures were chosen from amazon, with no logo to identify their respective brands. All tablet pictures and brand logos were of the same size and similar appearance (See Appendix 3). All products had three lines of product claims that were near identical to each other. Tablets were chosen as stimuli for two reasons. First, tablets were chosen because of their relevance to college students. Second, tablets look highly similar to each other regarding their appearance and specs. Tablets are a category that can satisfy the conditions to

create a highly competitive environment while controlling the physical appearance and attributes.

The reading comprehension article is about geography from the TOEFL test. The TOEFL is a required test for all international students, and was assumed to be understandable by all participants. The stimulus on the tablet screen was a video documentary, “The history of railroad transport” (See Appendix 4). The content of the documentary was the trains in The United States that were coming in and out of each station. This video has no sound in order to control perceptual modality. This decision was based on the theory of separate processing channels for the audio and visual information (Penney, 1989). Audio and visual channels have separate capacities for elaboration. By muting the video, it enables the study of a visual-only media-multitasking environment. The listening task was taken from the introductory lesson of Adam Smith’s economics “*The Wealth of Nations: Book 1*”. The content of the audiobook explains the relationship between supply and demand on a national level, narrated by a male speaking standard American English at a moderate pace. A 9.5 inch iPad is used on which media-multitasking groups watch the “The history of railroad transport.”

3.5 Measures

Awareness is the basic measure of advertising effectiveness. Awareness affects other measurements in advertising like attitude or purchase intention (Rossiter & Percy, 1983). Many studies have used recall and recognition to measure advertising awareness (Yonelinas, 2002; Stanislaw & Todorov, 1999).

3.5.1 Recall

Recall is the reproduction of information that was received earlier. It has been previously encoded and stored into conscious awareness as memory. Free recall involves retrieving information from memory without assistance of temporal or general contextual aspects of the

exposure. Effective retrieval requires that the information has been processed and rehearsed deeply on an elaborative level (Craik & Lockhart, 1972; Shiffrin & Schneider, 1977). According to the study by Sar, Nan and Myers (2010), they found an interaction effect between competitive ad contexts and mood on ad recall. Their study shows that individuals with an analytic processing style have a better recall compared to analytic processors in a non-competitive ad context while working on one single task, which provides a theoretical reason to include recall as one of the measurements.

In this experiment, free recall was measured by asking participants to write down as many brand names as they could remember from the website that they were exposed to during the experiment. Only completely correct spelling of exposed brand names was coded as recall success. Most participants in this study has either zero recall or perfect recall of different numbers of exposed brands, there was no minor misspelling of any kind. Therefore all misspelling are coded miss.

3.5.2 Familiarity

Recognition is a measure of awareness of having previously experienced the presented stimulus. When the previously experienced event is presented, this environmental content is matched to stored memory (Bagozzi & Silk, 1983). Recognition is possible even when the stimulus is processed at a shallow, sensory level (Rossiter & Percy, 1983). Recognition is typically better than recall in most studies (Bagozzi & Silk 1983; Brown 1976; du Plessis, 1994; Schaefer, 1995). This is because free recall requires individuals to retrieve the information from memory without assistance. Successful retrieval of previously exposed information requires participants to process and rehearse the information at a deeper level (Shiffrin & Schneider, 1977).

Recognition could be operationalized in two ways: brand-ad association (recollection), or brand name familiarity. Recollection is the retrieval of detailed information that is associated with previously experienced stimuli. Recollection tests the qualitative aspect of exposed stimuli and reflects associations between different components of an event (Yonelinas, 2002). Brand name familiarity is measured by the participants' awareness of the target stimulus, which was previously presented. Familiarity reflects the memory strength of a single item, by asking participants to discriminate between exposed and non-exposed items (Yonelinas, 2002). Recall and familiarity recognition, though correlated, are not uni-dimensional (du Plessis, 1994). Familiarity recognition is more sensitive and discriminating than recall and depreciates with time (Singh, Rothschild, & Churchill, 1988).

For this experiment, recognition was measured through familiarity. According to level of processing theory (Craik & Lockhart, 1972), processing the meaning of the stimulus compared to processing the perceptual features of the stimulus affects recollection more than it affects familiarity. At the stage of encoding, deep processing compared to shallow processing increases recollection more than familiarity. Because this study focuses on how different perceptual processing styles can affect memory, familiarity is measured instead of recollection to test the perceptual aspect instead of the cognitive aspect of the process. Signal Detection Measure (SDM) was used to measure participants' recognition scores. The Signal Detection Measure can help to differentiate between signals (stimuli) and noise (no stimuli) in participants' responses. Participants were exposed to eight brand logos and asked to identify which brands were shown previously on the website. Amongst those eight logos, four brands were shown on the website, while the other four brands were foils (Stanislaw & Todorov, 1999). If the recognition test is a forced choice test, the result of measure can range from 0.5 (zero recognition) to 1.0 (perfect recognition). If the subject circled the correct brand, it was coded as hit (1); otherwise it was

coded as 0. Hit rate is the total number of hit counts divided by the total number of correct brands. If the subject circled the foil brand, it was coded as false alarm; otherwise it was coded as 0. False alarm rate is the total number of false alarms counts divided by the total number of foil brands.

The formula for an A' (*detection success*) score is:

$$A' = 0.5 + \frac{(H - FA)(1 + H - FA)}{4H(1 - FA)}$$

Perceptual Processing Style

After the recognition test, participants filled out the 24-item AHS (Choi, Koo, & Choi, 2007) to measure analytic/holistic processing orientation. Higher scores meant that participants used more holistic processing style, while lower scores meant that participants had a more analytic processing style.

3.6 Results

All participants' performances were checked to ensure they followed instructions and performed each of the tasks correctly. As noted above, four individuals who did not follow the instructions and continued looking at the paragraph while doing the recall and recognition task were removed from the final analysis. The final number of participants was 123.

3.6.1 Mood Manipulation Check

The results of mood manipulation showed that participants who were in the positive mood group felt significantly more positive than those who were in the negative mood group [$F(1,121) = 82.33, p < .001; M_{\text{positive}} = 4.62(.09), M_{\text{negative}} = 3.46(.09)$]. There was no significant difference in arousal between the positive group and the negative group [$F(1,121) = 3.34, p > .05; M_{\text{positive}} = 3.71(1.63), M_{\text{negative}} = 3.18(1.59)$] indicating that mood manipulation worked.

3.6.2 Processing Style Check

There was a significant main effect of mood on processing style. Participants who were in a positive mood were more likely to use holistic processing style [$M_{\text{positive}} = 4.63(.71)$] than participants in a negative mood who tended to use more analytic processing style [$M_{\text{negative}} = 3.47(0.70)$; $F(1,121) = 22.03$, $p < .001$, $\eta^2 = .3$]. The processing style manipulation was successful.

3.6.3 Multitasking Manipulation

Participants answered five reading comprehension questions about the article (see Appendix 1) and could not look back at the paragraph when they were taking the comprehension test. Participants with only one task performed slightly better on the reading task than participants with two tasks and three tasks [$M_{\text{one}} = 3.71(1.30)$, $M_{\text{two}} = 3.33(1.22)$, $M_{\text{three}} = 3.05(1.25)$]. However, the means were not significantly different [$F(2,120) = 2.89$, $p = .06$, $\eta^2 = .01$].

3.6.4 Hypothesis Testing

In hypothesis one, I postulated that when participants were exposed to a competitive ad context their recall and recognition of the advertised brands would have decreased if they engaged in media-multitasking (two and three tasks) compared with those who engaged in a single media task.

Results showed that participants with a single media task could remember more ads compared to those with two or three media tasks. There was a significant effect of total number of tasks on recall [$F(2, 120) = 3.57$, $p > .05$, $\eta^2 = .06$]. Participants in one-task group [$M = .90(1.13)$] performed significantly better than two-task group [$M = .36(.84)$] and three-task

group [$M = .40(.85)$]. There was a significant main effect of the total number of tasks on recognition [$F(2, 120) = 3.99, p < .05, \eta^2 = .06$]. While the one-task group [$M = .66(.32)$] and the two-task group [$M = .59(.31)$] were not significantly different [$F(1, 121) = .61, p > .05, \eta^2 = .008$], the one-task group and the three-task group [$M = .47(.29)$] were significantly different [$F(1, 82) = 7.65, p < .01, \eta^2 = .09$].

In hypothesis two, we predicted that recall and recognition of the advertised brand would not be negatively affected for those who used a holistic processing style that was induced by a positive mood and engaged in media multitasking as compared to those who use analytic processing style that was induced by a negative mood when engaged in media multitasking.

There was no significant interaction effect of processing style and the number of tasks on recognition [$F(4,117) = 1.30, p > .05, \eta^2 = .02$], regardless of types of processing styles.

The results showed that participants who used a holistic processing style that was induced by a positive mood and who engaged with three tasks didn't show a significant difference of recognition scores between the one-task group and the three-task group [$M_{\text{one}} = .58(.37), M_{\text{three}} = .49(.28); p = .097$] or between the two-task group and the three-task group [$M_{\text{two}} = .53(.32), M_{\text{three}} = .49(.28); p = .103$].

According to post hoc Tukey's test, participants who used a holistic style that was induced by a positive mood and who engaged with three tasks didn't show a significant difference of recall scores when comparing between the one-task group and the three-task group [$M_{\text{one}} = 1(1.51), M_{\text{three}} = .48(.95); p = .257$] or between the two-task group and the three-task group [$M_{\text{two}} = .44(1.10), M_{\text{three}} = .48(.95); p = .26$].

Post hoc Tukey's test results showed that participants with an analytic processing style that was induced by a negative mood had a significantly greater recognition score for a single

task compared to three tasks [$M_{\text{single}} = .73(.24)$, $M_{\text{three}} = .44(.31)$; $p < .007$]. Participants in the two-task group also had a significantly greater recognition score compared to the three-task group [$M_{\text{two}} = .66(.31)$, $M_{\text{three}} = .44(.31)$; $p < .050$].

On the other hand, according to post hoc Tukey's test, participants with an analytic processing style that was induced by a negative mood did not have a significantly greater recall score for a single task compared to three tasks [$M_{\text{one}} = .79(1.08)$, $M_{\text{three}} = .45(.83)$; $p = .257$], nor was there a significant difference between two tasks and three tasks [$M_{\text{two}} = .29(.56)$, $M_{\text{three}} = .45(.83)$; $p = .260$] (see table 2).

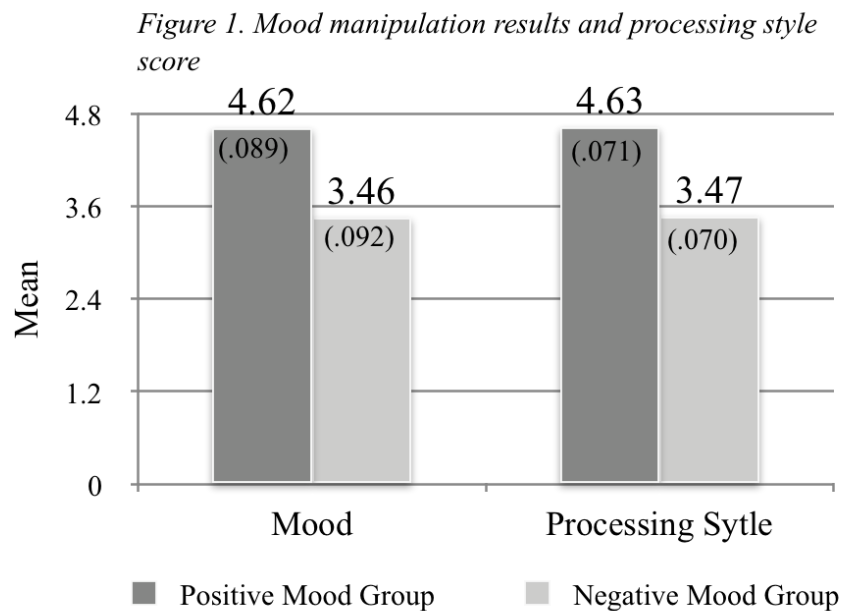


Figure 2. Average recognition and recall scores for different number of tasks

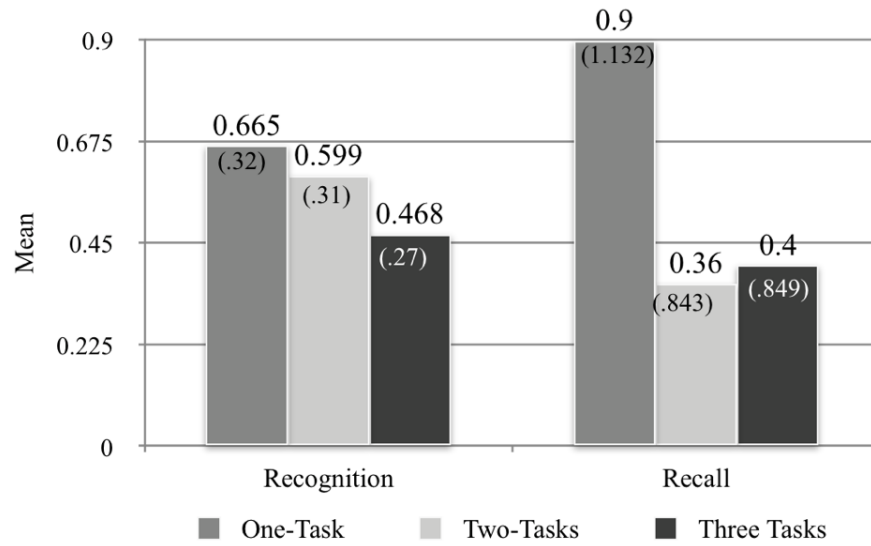


Figure 3. Average recognition scores for different number of tasks between holistic and analytic groups

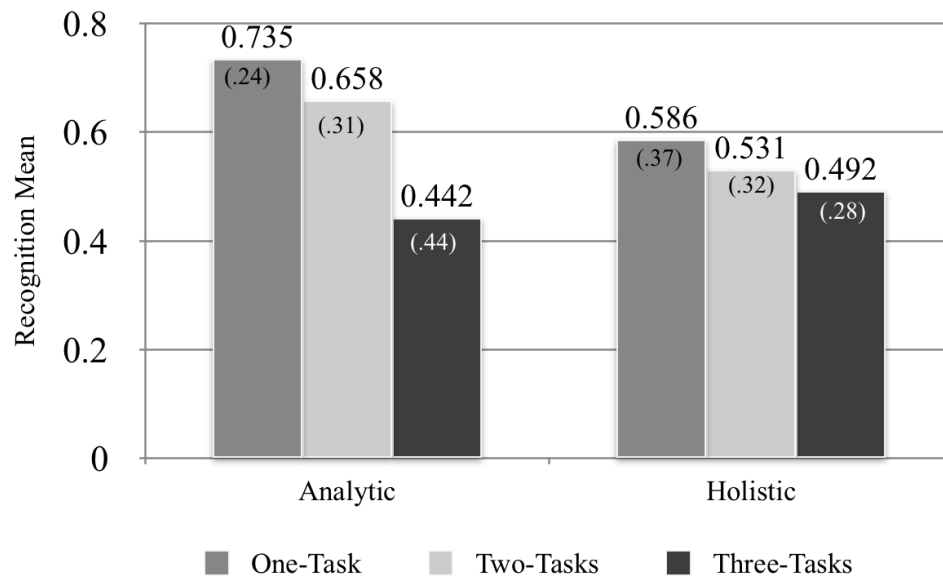
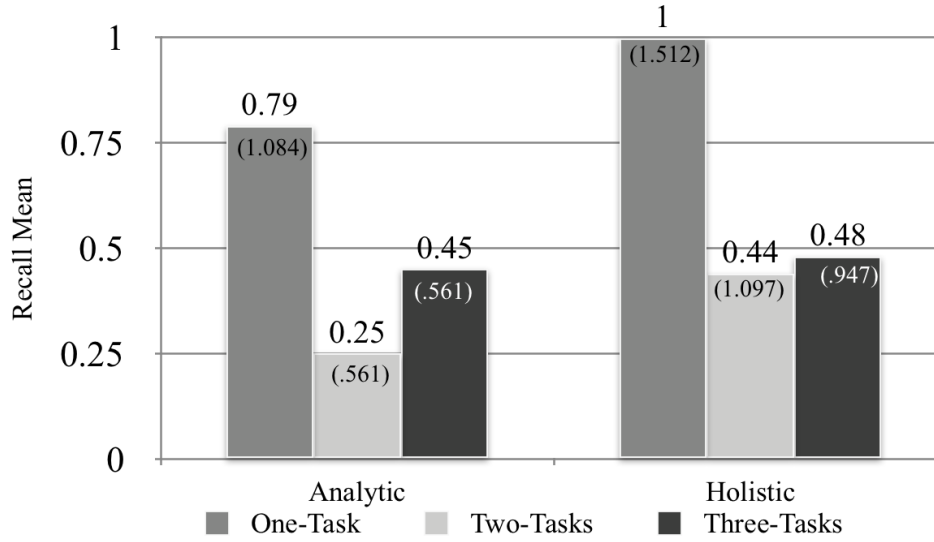


Figure 4. Average recall scores for different number of tasks between holistic and analytic groups



<i>Processing Style x Number of Tasks Factorial Analysis of Variance for Brand Recognition</i>		
Variable	Recall	Recognition
Holistic Processing Style		
One-Task N=20	1.00 (1.512)	.586 (.369)
Two-Tasks N=19	.44 (1.097)	.531 (.319)
Three-Tasks N=21	.48 (.947)	.492 (.285)
Analytic Processing Style		
One-Task N=20	.79 (1.084)	.735 (.246)
Two-Tasks N=20	.29 (.561)	.658 (.308)
Three-Tasks N=22	.45 (.832)	.442 (.310)

Table 3				
<i>Independent and dependent variables</i>				
Variable	Mean	SD	chronbach's alpha	Range
Reading Comprehension	3.36	1.281		5
Mood Manipulation Score	4.06	0.91	0.851	4.29
Number of tasks	2.02	0.83		2
AHS Score	4.4	0.73	0.781	4.17
Recall	0.55	1.05		4
Recognition	0.57	0.32		1

CHAPTER 4

DISCUSSION

4.1 Summary of Findings

There is a significant main effect of the total number of tasks on recall and reading comprehension. Because participants were not allowed to go back to the page to reread the article, both reading comprehension and recall depended solely on retrieval of the information they previously saw. There was a significant difference between the one-task group, the two-task group and the three-task group on participants' performance on the recognition task. Task interference studies have shown that even simple tasks performed simultaneously can lead to significant performance differences (Pashler, 1994). This result is consistent with the limited capacity model (Lang, 2000). This model explains why people's performance is worse under a media multitasking condition. According to this model, individuals possess limited resources to dedicate to encoding, understanding, and retrieving information processed from the world around them. Encoding is the process of selecting stimuli that will later be stored as mental representations of the environment. Retrieval is the mental activation of this information. In a multitasking environment, participants' attention is divided between several tasks simultaneously. They are exposed to high perceptual load that is fully exhausted by their central tasks, resulting little capacity left for the peripheral stimuli (Lavie, 1995). This explains why participants in the one-task group had a much higher score of recall and recognition compared with participants in the two-task and three-task groups.

There was not a significant difference between the two-task group and the three-task group on recall. One possible explanation for this result is attention modality. According to previous research (Wang et al., 2012), different combinations of media usage yielded different

results, indicating that combining internet browsing (visual) with radio listening (auditory) had a much less detrimental effect on memory compared to combining internet browsing and digital social media interaction, which are both visual tasks.

While mood manipulation and processing style were successful, there was not an interaction between processing style and the number of tasks. Maybe it was due to both positive and negative mood groups had scores that were very close to the mid point [$M_{\text{positive}} = 4.62(.089)$ and $M_{\text{negative}} = 3.46(.092)$]. The other possible reason why there was not an interaction effect between processing style and the number of tasks might be due to types of memory measure (recall and recognition). The method of measurement used in this study was familiarity recognition, which tested how well individuals knew the information based on whether the information was presented before (Squire, Wixted, & Clark, 2007). According to Duff and Sar (2015), while they didn't find any significant difference in recognition between participants who had used holistic processing styles and those who used analytic processing styles when multitasking, results of recollection measurement of the exposed brands showed that there was a significant difference between these two different processing styles. Based on Duff and Sar's study in 2015, it is reasonable to assume that, if recollection was used instead of recognition as the method of measurement, there might have been a significant interaction effect between processing style and media multitasking.

Although there was not a significant main effect of processing style, nor was there an interaction effect of processing style and the number of tasks on brand recall and recognition (familiarity), recall and recognition of participants with holistic processing style did not decrease. Between-groups results showed that, while participants with a holistic processing style did not have a significant decrease in the recognition task when the total number of tasks increased from one to three, participants with an analytic processing style suffered significantly in terms of

recognition. However, processing style did not have the same effect on recall. Both positive and negative mood groups (holistic and analytic processing style) recalled significantly worse when the total number of tasks increased from one to three tasks. This is consistent with the study by Duff and Sar (2015). In their study (Duff & Sar, 2015), participants who had utilized a holistic processing style did not feel that the tasks were significantly more difficult when the total number of tasks increased, while participants who used an analytic processing style said that one task is significantly easier than multiple tasks. This study indicates that not only do processing styles affect participants' perception of the difficulty of media multitasking, they also made recognizing brands less difficult for individuals with a holistic processing style when the total number of tasks increased. The difference in results of recall and recognition is due to the differing natures of these two kinds of memory. Both recognition and recall memory performance are closely related and depend on declarative memory, but only recognition memory depends on how the subject was perceptually primed, which means only recognition is affected by the processing style that was induced by mood (Haist & Shimamura, 1992; Duff & Sar, 2015).

4.2 Limitations

One limitation of this study was the mood manipulation. According to the experimental results, both the positive and negative groups' mood scores were very close to the mid point. While mood manipulation was successful and significantly affected processing style, the effect was not big enough to change how much consumers remembered the exposed brands. What's more, according to previous studies, negative mood manipulation is usually more effective than positive mood manipulation (Larsen & Timothy, 1989). This may have contributed to the lack of an effect of mood on recognition or recall of ads.

Another limitation was the selection of stimuli. Since the competitive ad context was

comprised of tablets of eight different fictitious brands, the iPad used in two-task and three-task groups to play the video might have a perpetual priming effect those two groups. Several studies have suggested that perceptual priming can affect recognition memory positively (Rajaram & Geraci 2000; Turk-Browne et al., 2006). It is possible that there could have been a bigger difference of recognition between the one-task group and two-task group if the two-task group didn't receive the priming effect from using the iPad. Furthermore, selection of target brands was not pretested which created possible confounded. For example, some studies showed that color might have an effect on perceptual processing style. According to Elliot et al. (2009), blue is generally associated with approach while red is associated with aversive arousal and failure. In this study, it was unclear if the different colors of the eight logos had changed participants' processing style due to lack of pretesting. Due to the complexity of controlling the color of brand logos and the absence of previous studies on how color interacted with media multitasking, this factor was not taken into consideration for this study.

A third limitation of this study is that a recollection memory test was not included as part of the measurement. According to Duff and Sar (2015), recollection is more sensitive to processing style manipulation compared to a recognition test. If recollection was included as part of the final measurement, there might have been a significant main effect of mood on memory. However, due to the need to study how a competitive ad context affects brand memory, brand claims in this study were intentionally designed to be highly similar to each other, which creates significant difficulty for participants in matching brand logos with their brand claims, rendering a recollection test a less effective measurement for brand memory. Recollection tests the qualitative aspect of exposed stimuli and reflects associations between different components of an event (Yonelinas, 2002). A recollection test requires participants to make judgments about the co-occurrence of different items, which is more in favor of a holistic processor. Familiarity, on

the other hand, reflects the quantitative memory, such as memory strength of a single item, by asking participants to recognize exposed and non-exposed items (Yonelinas, 2002). In the context of this experiment, participants with an analytic processing style might have a better performance in familiarity tasks since analytic processors are more likely to focus on a single item instead of paying attention to the association between different items. What's more, participants were not instructed to make forced choices according to the traditional SDM method, resulting in a comparative lower score of recognition and possible measurement biases.

A fourth limitation of this study was that processing styles were measured at the end of the study. While there was a significant relationship between mood and processing style, participants might have been exposed to the testing effects that render the results less accurate.

A fifth limitation of this study was the measurement of attention. There are four modes of attention: sustained attention, divided attention, selective attention and attention switching (McDowd & Birren, 1990). While participants in this experiment were instructed to pay equal attention to all tasks and were later questioned whether they paid equal attention to all tasks, there was no memory related question regarding how much attention did they pay to the listening task or the video viewing task. According to previous researches (McDowd & Birren, 1990). During media multitasking, two kinds of attention might happen: divided attention and selective attention. Participants with a divided attention can have a lower performance on at least one task due to limited resource capacity (Lang, 2000), while individuals with a selective attention could have focused on a task and filter out irrelevant information. Without the measurement of how much attention was paid to the second or third task, we only relied on participants' self-report instead of measurement to see how much attention did they pay to each task.

Another limitation of this study is the apparatus. While the competitive ad context was comprised of tablets of different fictitious brands, an iPad was used in two-task and three-task

groups to play the video. While the size of the effect is uncertain, it is possible that perpetual priming might have happened for two-task and three-task groups who were exposed to the iPad. Several studies have suggested that perceptual priming can affect recognition memory positively (Rajaram & Geraci 2000; Turk-Browne et al., 2006). Priming can enhance the efficacy of explicit memory at the stage of encoding (Miyoshi, Minamoto, & Ashida, 2014). Perceptual priming is based on the form of stimuli. Studies have shown that even when visual presentations are not perfectly consistent, perceptual priming can still affect explicit memory significantly (Geva, Moscovitch, & Leach, 1997). Since the two-task group and the three-task group were exposed to an iPad that has a similar shape to stimuli, it is possible that there could have been a bigger difference in recognition between the one-task group and two-task group if the two-task group didn't receive the priming effect from using the iPad.

4.3 Conclusions

This study has shown that processing styles induced by mood did play a role in how people pay attention to a complex media environment, such that individuals with a holistic processing style were more likely to recognize a previously exposed brand in an informational rich environment while media multitasking. Further research should be done to investigate different combinations of media multitasking as well as how processing styles that were induced by mood could interact with multitasking to affect consumer behavior.

The theoretical meaning of this study expands the current research on affect-as-information model by combining a competitive ad context, mood induced processing style, and media multitasking together. This study seeks to build on the study by Duff and Sar (2015) with different measurements (recall and recognition in this study instead of recognition and recollection), different ad formats (banner ad instead of TV commercials) and higher task

difficulty (reading comprehension compared to drawing slashes). Future studies might examine different measurements and combinations of primary task and secondary task formats to understand how media multitasking can interact with mood, different context, and different modality.

The findings from this study could also help advertising practitioners. The results could help advertising professionals better understand how media-multitasking and a competitive ad context can affect a consumer's memory of exposed brands. As mentioned in the introduction, media-multitasking is so prevalent amongst younger people that brands have to understand how advertisement effectiveness is affected by those variables. The findings from this study would benefit advertising professionals who wish to optimize their advertisement investment plan. For example, this study could help online advertising platforms like Google or Facebook to improve their online advertising ranking algorithm. With access to cookies and previous viewing history, Google can change the density of advertised information based on the affective valence of the contents consumers read. For example, if the viewer is watching a YouTube video that is a comedy (positive mood), more banners ads in the same category can appear with the ad as consumers are more likely to remember them. However, if the viewer watches a YouTube video that features negative content, fewer ads should be placed in that content because it would be difficult for consumers to use analytic processing to remember ads. As another example, if Facebook can run a real time analysis of all the posts each person reads and calculate the aggregated emotional valence of the posts combined for each viewer, it could adjust the density and the competitiveness of the ads displayed on the Facebook sidebar. For those who are reading Facebook threads that are negative in content, density can be lower, and vice versa for those who are reading posts that are positive in content.

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Appendix A

Questions for Mood Manipulation

Thank you for agreeing to participate in this research project. Your answers are very important to this research. Your time and cooperation is appreciated.

I. Please answer the following questions as truthfully as possible and provide as much detail as possible for each question. As you answer each question make sure that you try to make your answers as negative (positive) as possible so that the person who reads your answers will also feel negative (positive) just from reading them. You have 5-10 minutes to do this task.

1. Please briefly describe five events or situations that make you feel really BAD? (Please leave space between questions for answers).

2. Please describe in more detail two of the events/situations (i.e., you listed above).

Appendix B

Reading Comprehension Questions

Please answer the following questions based on the reading shown on the computer

1. Stalagmites are formed by

- (A) drops of water which enter through cracks in the ceiling.
- (B) underground rivers which flow through the cave.
- (C) water dripping from an overhead stalactite.
- (D) water which trickles down a slope.

2. Sinkholes are

- (A) the decorative dripstone features found in caves.
- (B) natural openings on the surface that lead to caves.
- (C) colorful layers of mineral deposits.
- (D) None of the above

3. Which speleothem grows upward from the floor ?

- (A) Stalagmites
- (B) Stalactites
- (C) Sinkholes
- (D) Curtains

4. An "inclined ceiling" is one which

- (A) is straight.
- (B) is crooked.
- (C) is slanted.
- (D) is wet.

5. Which of the following are NOT caused by dripping water ?

- (A) Stalagmites
- (B) Stalactites
- (C) Slopes
- (D) Curtains

Appendix C

Recall and Recognition Questions

Please write down all the brand names you remember shown on the website

Please circle the brand logos that appeared on website

TONZE

lecon

longde

SUPOR

PESKOE

POVOŞ

WEKING

ROBAM

Appendix D

AHS Questions

V. We would like to ask you some questions regarding your agreement with the following statements. Please circle the number that best describe your agreement/disagreement on the following statements, where 1 means strongly disagree and 7 means strongly agree.

1. An individual who is currently honest will stay honest in the future.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

2. Any phenomenon has numerous numbers of causes, although some of the causes are not known.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

3. Everything in the universe is somehow related to each other.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

4. We should consider the situation a person is faced with, as well as his/her personality, in order to understand one's behavior.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

5. Nothing is unrelated.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

6. A person who is currently living a successful life will continue to stay successful.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

7. Any phenomenon entails a numerous number of consequences, although some of them may not be known.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

8. Even a small change in any element of the universe can lead to significant alterations in other elements.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

9. The whole is greater than the sum of its parts.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

10. Future events are predictable based on present situations.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

11. When disagreement exists among people, they should search for ways to compromise and embrace everyone's opinions.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

12. Everything in the world is intertwined in a causal relationship.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

13. It is more desirable to take the middle ground than go to extremes.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

14. Current situations can change at any time.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

15. The whole, rather than its parts, should be considered in order to understand a phenomenon.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

16. It is not possible to understand the parts without considering the whole picture.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

17. If an event is moving toward a certain direction, it will continue to move toward that direction.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

18. Every phenomenon in the world moves in predictable directions.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

19. It is more important to pay attention to the whole than its parts.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

20. It is more important to pay attention to the whole context rather than the details.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

21. It is desirable to be in harmony, rather than in discord, with others of different opinions than one's own.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

22. Choosing a middle ground in an argument should be avoided.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

23. It is important to find a point of compromise than to debate who is right/wrong, when one's opinions conflict with other's opinions.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

24. We should avoid going to extremes.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

Appendix E

Webpage on Desktop

**cyber
week
sale**
Monday only
take 15% off

**SALE
SALE**

How Stalactites and Stalagmites Form

The most familiar speleothems (from the Greek word *spelaion* for cave and *thema* for deposit), the decorative dripstone features found in caves, are stalactites and stalagmites.

Stalactites hang downward from the ceiling of the cave and are formed as drop after drop of water slowly trickles through cracks in the cave roof.

Stalagmites grow upward from the floor of the cave, generally as a result of water dripping from an overhead stalactite. A column forms when a stalactite and a stalagmite grow until they join. A "curtain" or "drapery" begins to form on an inclined ceiling when drops of water trickle along a slope.

Natural openings on the surface that lead to caves are called sinkholes, or swallow holes. Streams sometimes disappear down these holes and flow through the cavern. Rivers may flow from one mountain to another through a series of caves. Some caverns have sinkholes in their floors. Water often builds up a rim of dripstone around the edge of the hole.

Dripping water often contains dissolved minerals as well as acid. These minerals too will be deposited; and they may give rich coloring to the deposits. If minerals in the water change, layers of different colors may be formed.¹⁹⁴⁷



Google Android 6.5 Tablet
1024*600 HD Resolution
16GB Flash



Microsoft 6..5 Tablet
1024*600 HD Resolution
1G Processor



Google Android 7.0 Tablet
1024*600 HD Resolution
1G Processor



Microsoft 7.0 Tablet
1024*600 HD Resolution
1G Processor



Google Android 7.0 Tablet
1024*600 HD Resolution
16GB Flash



Microsoft 6.5 Tablet
1024*600 HD Resolution
16GB Flash



Google Android 6.5 Tablet
1024*600 HD Resolution
1G Processor



Microsoft 7.0 Tablet
1024*600 HD Resolution
16GB Flash

Appendix F

Video and Audio Clips

<https://www.youtube.com/watch?v=7GV18QXWqdE>

“The History of The Rail Transport”



Audio Content in the Audio task

<https://www.youtube.com/watch?v=UsCkFopWSuw>

“The Wealth of Nations Book 1 Chapter 1 Audiobook “

Appendix G

Consent Form

Purpose of the research: The primary purpose of present study is to understand how consumer's mood affects their processing style and memory for advertising

This study is being conducted by graduate student Clyde Duduo Zhang under the direction of Professor Sela Sar, an associate professor in the Department of Advertising. If you have any questions, please feel free to contact Professor Sela Sar at selasar@illinois.edu or Clyde Zhang at dzhang47@illinois.edu

Procedure: If you agree to participate in this study, we would ask you to do the followings:

- ☐ You will be asked to describe your past experience
- ☐ You will be asked to view several advertisements and read an article at the same time.
- ☐ You will be asked to respond to some questions regarding the ads that you will view. You also will be asked respond to some questions regarding an article that you read during an experiment.
- ☐ You might be asked to watch a short scientific documentary film about trains or listen to a short audio clip about basic economics.

Your answers will in no way be linked to your name or identifying features.

You have the right to leave the study at any time with no penalty.

The anticipated duration of the study is within 20-25 minutes.

Risks and Benefits: We do not believe there are any risks associated with the study other than those encountered in day-to-day life. There are no direct benefits to you in terms of increased knowledge, improved safety, technological advances or better health.

Compensation: You will receive research participation credit, in an amount determined by your course instructor.

Voluntary Withdrawal: Your participation in this study is completely voluntary; the decision to participate, decline or withdraw from this study will have no effect on your status at, or future relations with, the University of Illinois.

Confidentiality: Your participation in the study will remain confidential. The records of this study will be kept private. In any sort of report we make public we will not include any information that will make it possible to identify you. Students will not identify themselves on the questionnaire. Consent forms will be collected prior to distribution of the questionnaire, thus further protecting participant confidentiality. The sign-in sheet for extra credit will be kept in a separate location, away from the questionnaire. In general, we will not tell anyone any information about you. When this research is discussed or published, no one will know that you were in the study. However, laws and university rules might require us to disclose information about you. For example, if required by laws or University Policy, study information which identifies you and the consent form signed by you may be seen or copied by the following people

or groups:

- The university committee and office that reviews and approves research studies, the Institutional Review Board (IRB) and Office for Protection of Research Subjects;
- University and state auditors, and Departments of the university responsible for oversight of research.

Dissemination of Results: It is proposed that the data will result in master thesis, possibly journal articles and conference presentations as well as sharing with the industry (advertising).

Contacts and Questions: If you have any questions about your rights as a participant in this study or any concerns or complaints, please contact Sela Sar at selasar@illinois.edu or Clyde Duduo Zhang at dzhang47@illinois.edu

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), you are encouraged to contact the University of Illinois Office for the Protection of Research Subjects. If you have questions about your rights as a participant in this study, please contact the University of Illinois Office for the Protection of Research Subjects at 217-333-2670.

Agreement: The purpose and nature of this research have been sufficiently explained and I signify that I am 18 years of age or older and agree to participate in this study. I have read the above information. I have asked questions and have received answers. I voluntarily agree to participate in this study.

Participant First Name (First & Last, Please Print)

Participant Signature

Participant UIN Number

Date