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Measuring and Assessing the Impact of Preattentive Processing on Ad and Brand Attitudes

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A typical yet frustrating situation for advertisers is that consumers pay little or no attention to advertisements. For example, they are likely to be engaged in conversation or driving when exposed to broadcast ads or reading an article when a print ad is present. Conventional wisdom holds that the resulting low levels of ad processing under such conditions reduce the ad's effectiveness, because conscious processing of ads is thought to be necessary for ads to impact consumers' preferences. Indeed, a number of measures of advertising effectiveness (i.e., recall, recognition, comprehension) assume consumers are aware of and can remember an ad.

Recent research in psychology suggests that information that is present but "ignored" can, in fact, be processed, albeit at a nonconscious, preattentive level. Furthermore, recent theory suggests that this type of processing can lead to changes in judgments about the preattentively processed information (i.e., increased liking for the ad and brand), even though consumers cannot recall having seen the preattentively processed stimulus before. Even more interesting is that some empirical work in an advertising context has shown that preattentively processed stimuli can affect consumer judgments about an ad or brand (Janiszewski, 1988, 1993; Shapiro & MacInnis, 1992).

Unfortunately, past research is limited in demonstrating that observed effects are due to the preattentive processing of ads as opposed to alternative explanations. Moreover, there currently exists no stringent methodology for stimulating or measuring preattentive processing. Of particular concern is whether the

methodology ensures that no conscious processing of the ads occurs during the exposure and measurement activities. If, however, these methodological issues were resolved, and if preattentively processed ads were shown to impact consumer judgments, we would have evidence that exposure itself is, in some situations, likely to affect consumers' brand judgments. Thus, substantially new theory about advertising exposure and consumer information processing would be evidenced. Moreover, we would have novel insights into alternative measures of advertising effectiveness. For example, if advertisements that are ignored still affect brand attitudes, care must be taken in interpreting measures of advertising effectiveness based solely on recognition, recall, or comprehension.

The purpose of this research is threefold. First, a new, more stringent method designed to investigate preattentive processing of print ads is tested. Second, using this new method and novel indicators of preattentive processing, more convincing evidence will be given regarding the relationship between preattentive processing and consumer attitudes than has been offered in the past. Third, a direct comparison is made between the impact of consciously processed and preattentively processed ads on consumers' attitudes toward the ad and brand.

LITERATURE REVIEW

As indicated in greater detail later, emergent literature in advertising and psychology suggests that individuals can process information that is just outside the focus of attention, even though they are not consciously aware of it. The processing of this information has been shown to influence individuals' judgments about (i.e., affect their attitude toward) the stimulus processed preattentively. Before discussing this literature in more detail and describing the issues examined in this research, we first describe preattentive processing, and distinguish it from related research streams. Table 3.1 guides the discussion.

A majority of research on advertising effects focuses on consumers' conscious processing of an advertisement (Stream I in Table 3.1). In this research, respondents' primary task is to direct their attention to the information in the ad, and they are fully conscious of what the information is (i.e., they have the ability to acknowledge that they are being presented with the information; Kihlstrom, 1990). Research in this area typically focuses on the effects of

TABLE 3.1
Distinguishing Streams of Research in Information Processing

Streams of Research	*Attentional Focus on the Ad vs. Surrounding Context*	*Who Determines Whether the Ad Achieves Awareness*	*Is Awareness of the Ad Achieved?*
I. Conscious processing	Ad	Consumer	Yes
II. Preconscious processing	Ad	Advertiser	No
III. Preattentive processing	Surrounding context	Consumer	No

processing different types of ads on consumers' memory (e.g., Childers, Heckler, & Houston, 1986; Costley & Brucks, 1992; Heckler & Childers, 1992; Keller, 1987), beliefs (e.g., Lutz, 1975, 1977; Mitchell & Olson, 1981), and attitudes (e.g., Edell & Staelin, 1983; MacKenzie, Lutz, & Belch, 1986; Mittal, 1990).

A second, less heavily researched stream labeled preconscious processing (Stream II in Table 3.1) focuses on respondents' processing of information typically presented at such a fast rate or in such a degraded form that it cannot be consciously perceived, even though they focus their attention directly on the spot where information is being delivered. Respondents are unaware of the existence of this information because it is presented subliminally (i.e., just below the perceptual threshold; Marcel, 1983a, 1983b; Moore, 1988; Reber, 1985; Synodinos, 1988). A main characteristic of this phenomenon is that the denied access to consciousness of information is controlled by the advertiser (i.e., information is deliberately presented below the perceptual threshold). Although there is evidence in both marketing and psychology for the existence of subliminal perception, evidence for its effects on consumers' attitudes and behaviors is unclear. The research remains controversial and the practice is generally regarded as unethical.

A third and distinct research stream labeled preattentive processing (Stream III in Table 3.1) focuses on respondents' "processing" of information that is just outside their focus of attention. Such would be the case, for example, when consumers flip through a magazine looking for or reading a particular article (thus focusing their attention on the article), and in the process "overlook" the many ads to which they are exposed. Like research on preconscious processing, this research stream deals with situations in which consumers are unaware of the nonattended information. Unlike research on preconscious processing, however, consumers, not advertisers, are responsible for denied access of information to consciousness (i.e., they are not conscious of it because they are paying attention to something else, not because advertisers control the nature of the exposure).

Given the enormity of advertising clutter (Britt, Adams, & Miller, 1972; Webb & Ray, 1979), and given that consumers are often involved in tasks that occupy their attention and thus limit their opportunity to attend to and process ads (MacInnis, Moorman, & Jaworski, 1991), understanding the potential impact of ads processed at a preattentive level is important.

Some research on preattentive processing has appeared in the marketing literature. In the studies conducted to date, consumers were exposed to a mock newspaper containing several articles and target ads. Ads, either pictorial or verbal in nature, were placed to either the right- or left-hand side of an article in the newspaper. Subjects were told to read the articles, and were later tested for their liking for and recognition of the target ads. This research examined situations that facilitate preattentive processing (Janiszewski, 1988, 1993) and provided evidence that preattentively processed ads and brands are evaluated more favorably despite the fact that consumers cannot remember having previously seen the ads (Janiszewski, 1988, 1993; Shapiro & MacInnis, 1992).

Unresolved Issues

Despite these intriguing results, several issues need to be resolved before one can feel confident about the effects of preattentively processed information on ad and brand attitudes. These include issues regarding (a) the control of attention during the exposure activity, (b) the identification of valid measures of attention, (c) the identification of valid measures of preattentive processing, and (d) the measurement of any differential impact of attentive versus preattentive processing of ads on ad and brand attitudes.

Controlling Attention. Studying preattentive processing requires a method that controls the focus of attention so that attention is focused on the surrounding context and not on the ad. Unfortunately, prior methods have had consumers simply read a mock newspaper—a procedure that allows consumers considerable freedom to glance at the surrounding ad content. For example, 20% of the consumers in Experiment 3 of Janiszewski's (1993) study claimed to recognize the target ad, suggesting that these consumers used conscious versus preattentive processing to process the target ads. Although some conscious processing may be a natural part of the typical consumer viewing context, it is not desirable for the careful study of preattentive processing.

Measuring Attention. In addition to providing a method that provides greater control over attentional focus, it is necessary to have some independent measure of attention so as to determine that processing is indeed operating at a preattentive level. Previous studies by Janiszewski (1988) and Shapiro and MacInnis (1992) did not provide this evidence. Janiszewski (1993) did provide eye tracking data in one experiment to provide "online" evidence of attentional focus. However, individuals can devote attentional resources to information not in focal view (Posner, 1980; Sperling & Melchner, 1978). Thus although eye tracking data may accurately reflect where consumers are focusing their attention, it does not accurately reflect where subjects are devoting attentional resources. Moreover, eye tracking equipment is cumbersome and certainly does not reproduce normal viewing behavior. Ideally then, measures of attention that do not interfere with normal viewing behavior, and that provide better insight into the allocation of attentional resources are needed.

Measuring Preattentive Processing. In addition to measuring the allocation of attentional resources, independent measures are needed to demonstrate that preattentive processing has occurred. All information, whether processed consciously or at a preattentive level, activates a memory representation of the material. This activation, known as priming, increases the likelihood that the activated stimulus will be retrieved from memory. If consumers process a brand name at a preattentive level, there is a greater likelihood that they will mention that name when asked to name brands in the product category than if they had

not been exposed to the brand name at all. Therefore, evidence of this priming effect is necessary to support that preattentive processing has occurred. Priming is often assessed using an implicit memory task (Graf & Schacter, 1985; Schacter, 1987) in which individuals' memory performance is shown to be facilitated even though they report no awareness of having been exposed to the object before. Janiszewski provided no independent measures of priming. Shapiro and MacInnis (1992) did use an implicit memory task to assess priming, however due to the small sample size (all *N*s less than 9) further investigation is needed before any conclusions can be reached.

Measuring the Differential Impact of Attentive Versus Preattentive Processing

Finally, it seems important to examine the impact of preattentively processed ads on ad and brand attitudes compared to ads that have been processed at an attentive (conscious) level. From the standpoint of measuring advertising effectiveness it would be interesting to determine whether ads processed preattentively create ad and brand attitudes that are as favorable or perhaps even more favorable than ads processed at a fully attentive, conscious level.

The objectives of this research are thus (a) to develop and test a method that will control attentional focus and measure the allocation of attentional resources, (b) to show a direct link between preattentive processing, and ad and brand attitudes, and (c) to investigate the differential impact of preattentively versus attentively processed ads on ad and brand attitude.

With respect to the last two objectives we expect that:

- Processing an ad in a preattentive manner will prime the brand depicted within the ad and thus create an implicit memory trace for the brand even though recognition of the ad will be at levels no greater than that expected by chance.
- Processing an ad in a preattentive manner will lead to an increased evaluation of the ad and brand even though recognition of the ad will be at levels no greater than that expected by chance.
- Ads processed preattentively will create ad and brand attitudes that are as favorable or more favorable than ads processed attentively.

RESEARCH METHOD

Controlling and Measuring Attentional Resources

One of the primary contributions of this research is the development of a new methodological tool that allows the researcher to retain a high level of control in the exposure process while presenting subjects with realistic information. Specifically, to gain better control over subjects' use of attentional resources,

this study uses a computer-based magazine rather than a paper-based magazine. A picture of the computer screen can be seen in Fig. 3.1. The computer screen is divided into three columns by two thin lines running vertically down the computer screen. The article to be attended is displayed in the middle column. The information in all three columns scrolls up the computer screen line by line at a predetermined rate. Subjects' task is twofold. One task is to comprehend as much of the article displayed in the middle column as they can as the article is scrolling line by line up the computer screen. At the same time, subjects are asked to perform a cursor-moving task.

As shown in Fig. 3.1, the computer screen contains a happy face cursor fixated vertically on the second to the top line of the middle column (hereafter called the attended line). The cursor can move to the left and right on the attended line within the boundaries of the middle column. Subjects' task is to move the cursor in such a way that it is positioned between two words when the next line of text scrolls up. In other words, the goal is to avoid having the cursor hit a word. If the cursor does hit a word, an error is detected and an audible beep is sounded. Although this cursor-moving task is not completely representative of an actual viewing situation, it does simulate the attentional requirements of driving a car, having a conversation, or quickly reading a magazine article, when also being exposed to advertisements.

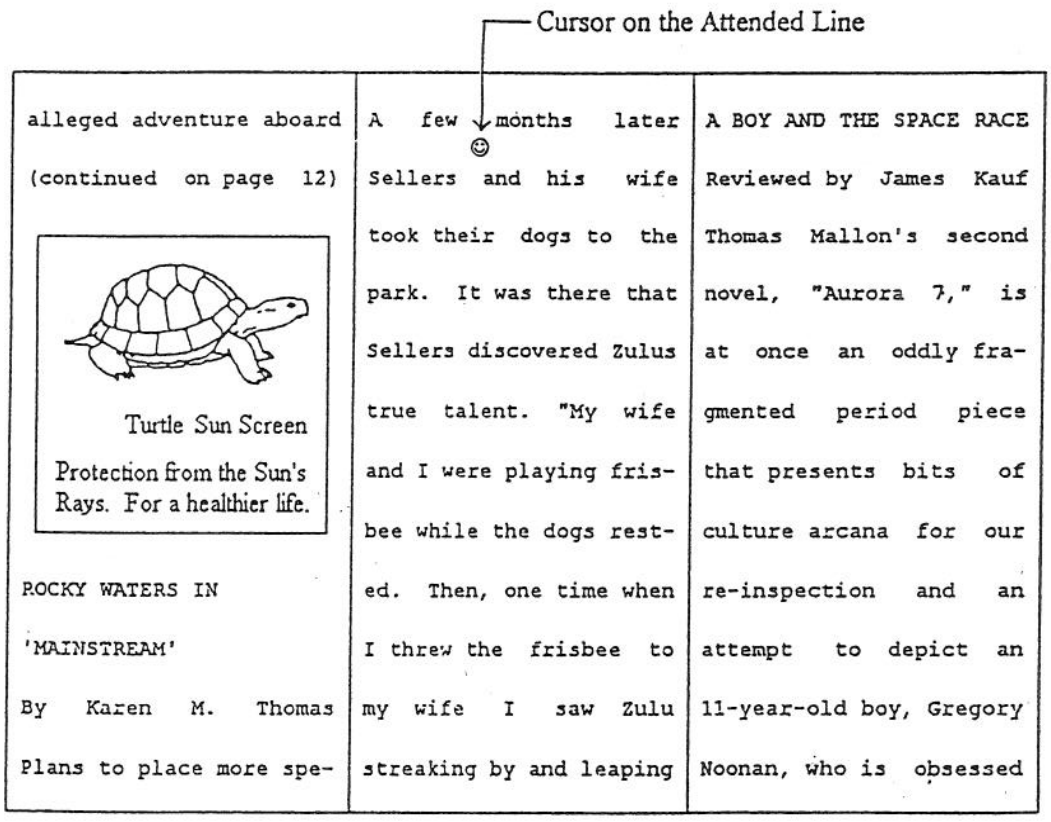


FIG. 3.1. Processing instrument.

The brand depicted in the target ad was in direct line with the attended line, but in subjects' peripheral vision, for approximately 2.5 seconds as it scrolled up the computer screen and out of sight. Based on previous research (Janiszewski, 1988), pictorial ads were placed to the left of the middle column. Additional articles displayed above and below the target ads were present simply to make the computer-based magazine more similar to an actual magazine (or newspaper).

This method not only allows greater control over attentional focus, it also provides a manipulation check measure of attentional focus. Specifically, if subjects do shift their attention away from the middle column and toward the left- or right-hand column of the computerized magazine when something as different as an ad passes by the attended line in the subjects' periphery (i.e., in the left- or right-hand column), we would find more errors than when only text material is in their periphery. The number of errors when the target ad is passing relative to the number of errors made immediately before and after exposure to the target ad therefore provides independent evidence of attentional focus. Equal numbers of errors indicate that subjects did not shift their attention during ad exposure. To enhance subjects' skills in using the cursor, and thus rule out lack of experience in using the cursor as an explanation for the number of errors, subjects were given practice sessions in using the cursor. Furthermore, the cursor task begins well before exposure to the target ads and continues well after exposure to the target ads.

Measures of Preattentive Processing

In addition to using the manipulation check measure given earlier to determine attentional focus, several measures were taken to assess whether information was preattentively processed. The existence of preattentive processing is indicated by two measures: (a) implicit memory for the target brand name, and (b) no evidence for recognition of the target ad.

Measures of Implicit Memory. Evidence for priming of verbal information is typically conducted by using word fragments. Specifically, if a word such as *hope* had been primed in memory, subjects presented with the word fragment h _ _ _ should be more likely than subjects who were not primed with this word to fill in the blanks to make the word *hope* versus different words (like *hill*, *hole*, or *help*). In this study, pictorial implicit memory measures are needed to provide evidence that the ads and brands depicted in the target ads are preattentively processed and thus primed in memory.

Although similar measures have rarely been used to assess implicit memory for pictorial stimuli, considerable effort at developing these measures has been undertaken by the authors. Through several rounds of pretesting, picture fragments were developed for the target brands. As illustrated in Fig. 3.2, each brand picture was fragmented so that there were a total of nine fragment levels with Level 9 being the completed picture and Level 1 being the most fragmented

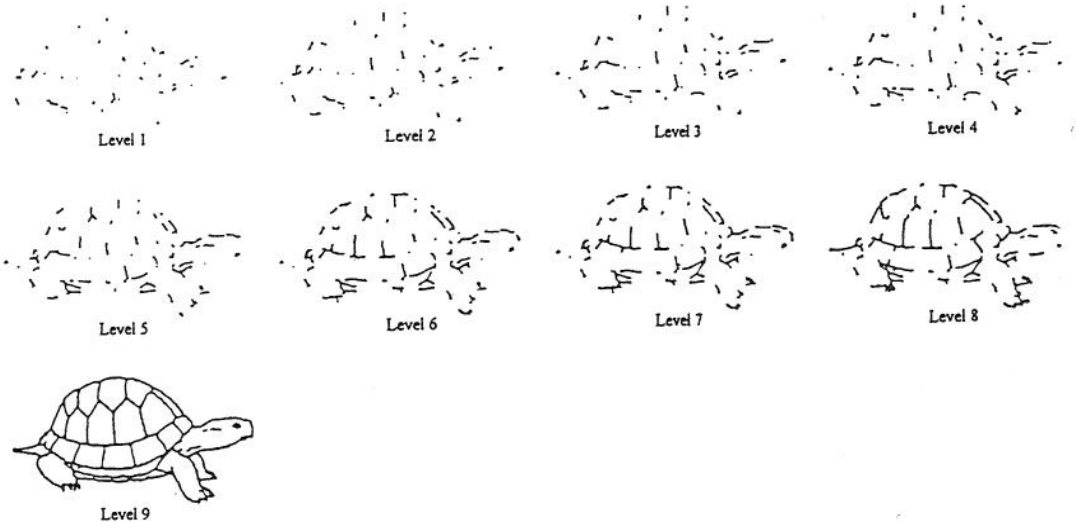


FIG. 3.2. Implicit memory picture fragment measure for Turtle Sun Screen.

picture (Snodgrass & Corwin, 1988). To assess implicit memory, subjects are shown each fragment one level at a time starting with Level 1. The task is to try to identify the object (i.e., brand depiction) at each level correctly. The measure of interest is the level at which subjects can correctly identify the object. Implicit memory would be demonstrated if subjects who had been exposed to the ad (presumably at a preattentive level) recognize the object at a lower level of completion (i.e., more fragmented) than a control group who had been exposed only to the computer magazine, but not the target ads.

Recognition Memory. Priming by itself does not, however, indicate preattentive (vs. conscious) processing. In addition to showing priming effects, preattentive processing requires that subjects do not report recognition of the ad. To measure recognition memory, subjects were shown six ads—the two target ads and four distractor ads. They were instructed to think back to the computer task and indicate whether they recognized having seen any of the ads at any point during their exposure to the magazine articles. Lack of conscious awareness of the ads would be indicated if subjects who had been exposed to the target ads show no greater awareness of the target ads than a control group of subjects who had been through the same experimental procedure without having been exposed to the ads.

To test our first hypothesis, we expect to find greater levels of implicit memory for subjects exposed to ads in the processing task versus subjects in the control group who performed the same processing task devoid of any ads. We also expect to find equal levels of recognition of ads for subjects in the preattentive processing experimental group and control group.

Measuring the Differential Impact of Attentive Versus Preattentive Processing

The brand names and ads used in this research were based on several rounds of pretesting designed to allow the measurement of any differential impact of

preattentive versus conscious processing. To assess this differential impact, it is important to select brands and ads for which prior attitudes have not been established. Thus, novel and fictitious brands and ads are used in the study. Additionally, ads and brands evaluated as neutral in pretests have been identified to provide the opportunity for affect change. Finally, in order to create pictorial ads, concrete brand names were selected that could be communicated through a single object.

Brands were evaluated on three 9-point bipolar scales: unappealing/appealing, unlikable/likable, and unpleasant/pleasant ($\alpha > .95$). A set of related ads were evaluated on four 9-point bipolar scales: unappealing/appealing, likable/unlikable, unpleasant/pleasant, and unattractive/attractive ($\alpha > .93$). The ads and brands selected for the study elicited statistically equivalent neutral ratings. The ads and mean rating responses can be seen in Fig. 3.3.

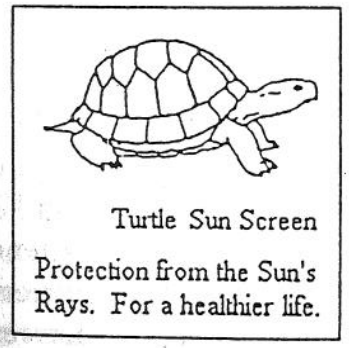
To test the other two hypotheses, we expect to find that participants in the preattentive processing experimental group will show more favorable brand and ad attitude versus those in the control group, and will show as favorable (or perhaps more favorable) brand attitudes as participants in the attentive processing group.

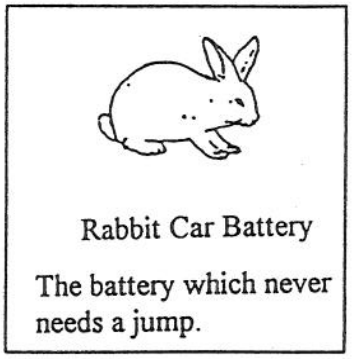
Subjects

Subjects were 48 undergraduate students who participated in the experiment for course credit. Experimental sessions were conducted over a 3-week period and ranged in sizes from 3 to 12 subjects per session.

Design and Procedures

A mixed factorial design was used with three groups (control, preattentive, and attentive) as the between-subjects factor and two experimental ads (Rabbit Car Battery and Turtle Sun Screen) as the within-subject factor. The control group of subjects ($N = 16$) were exposed to the computer magazine and completed





Mean Ad Attitude Rating	= 5.51	Mean Ad Attitude Rating	= 5.28
Mean Brand Attitude Rating	= 5.53	Mean Brand Attitude Rating	= 4.97

FIG. 3.3. Experimental ads and mean rating responses given in pretest

the task in exactly the same manner as the other subjects, except they were not exposed to the target ads. The experimental subjects ($N = 32$) followed the same procedure as the control subjects with respect to exposure to the computer magazine, except they were exposed to the two target ads. Half the subjects in the experimental group were told that they would also be asked questions regarding the ads that pass by in the left-hand column of the processing task (the attentive processing group) and half were not told anything about the presence or absence of ads in the processing task (the preattentive processing group). Within each of these two conditions, all subjects were exposed to both ads, allowing for a sample size of 32 for each processing condition. Order of ad exposure was counterbalanced between subjects.

All subjects were told that the purpose of the study was to determine how distraction affects their ability to recall and comprehend magazine articles. Subjects were given the processing task instructions and were allowed to practice with the cursor-moving portion of the processing task before completing the experimental portion. Following the processing task, subjects completed a distraction task, the implicit memory fragment completion measure, ad and brand attitude measures, and the ad recognition task. Subjects in all groups also completed several covariate measures. All subjects were then debriefed.

RESULTS

Assessing the Validity of the Method

An examination of the total number of errors made while performing the processing task can provide some indication of how involving the processing task was, and therefore the extent to which it occupied attentive resources. Error rates close to zero would provide evidence that subjects did not need to devote all their attentive resources to the assigned processing task. If this were the case, it could be argued that subjects had the ability to complete the processing task and consciously process the target ads simultaneously. Additionally, error rates near 100% might suggest that the processing task was too difficult, causing subjects to give up and thus freeing up attentive resources to process the target ads consciously. The mean number of errors made out of a possible 54 in the processing task was 15.69 (29.1%), 16.56 (30.1%), and 17.56 (32.5%) in the control group, preattentive processing group, and attentive processing group respectively. *T* test comparisons indicate that these differences between experimental groups are not significant (all $ps > .5$). This result indicates that the processing task was equally challenging across experimental groups, and yet not so difficult that subjects would give up.

To assess the validity of the computerized magazine method further, its ability to detect shifts in attention was examined. Because subjects in the attentive

processing group were also instructed to pay attention to the ads passing by in the left-hand column of the computer magazine, they should have at some point shifted their attention away from the middle column and toward the left-hand column when performing the processing task. If this method is valid, it should be sensitive enough to detect this shift in attention. An increase in the number of errors in the cursor-moving task would be evidence of a shift in attention away from the middle column of the processing task. Hence, an increase in the number of errors in the attentive processing group versus the preattentive processing group and control group during ad exposure would be evidence that those in the preattentive processing group did not shift their attention to the ads and thus did not consciously process the ads.

To ascertain when subjects in the attentive processing group shifted their attention toward the ads, several questions were asked of these subjects after the experiment was completed. Subjects reported having looked at each ad only once ($X = 1.4$, mode = 1) as the ads scrolled up the computer screen, and further, that they looked at each ad when the ads were approximately 5 lines ($X = 4.7$, mode = 5) below the attended line. Therefore, four sections of the processing task were investigated: 8 to 10 lines before the target ads, 4 to 6 lines before the target ads (where subjects in the attentive processing group indicated they shifted their attention to the target ads), the three lines as the brand depiction was passing the attended line, and the three lines just after the ads passed the attended line. Hereafter, these sections are referred to as the Before-Before section, Before section, During section, and After section respectively (see Fig. 3.4).

An analysis of variance (ANOVA) was run to test for the main effect of group (attentive vs. preattentive vs. control) on the error rate for each section of the processing task. Results support the ability of the method to detect shifts in attention and suggest that subjects in the preattentive processing group did not shift their attention to the target ads when completing the processing task. The average number of errors made in Lines 4 through 6 (i.e., in the Before section) was significantly greater in the attentive ($X = .97$) versus preattentive processing group ($X = .50$) and control group ($X = .56$, $F = 4.37$, $p < .02$).[1] This result is consistent with earlier findings from those subjects in the attentive processing group who claimed to have looked at the ads approximately five lines before the target ads were in line with the attended line. Additionally, the error rate between the preattentive processing group and control group was not significantly different in the Before section, indicating that those in the preattentive processing group did not shift their attention to the target ads at this point in the processing task. Further, the number of errors made in the Before-Before section, During section, and After section were not significantly different across the three groups (all Fs $< .2$, ps all $> .8$; see Fig. 3.4), indicating that subjects in the attentive and preattentive processing groups did not shift

[1]Because the text in the processing task was double spaced, a maximum of 2 errors could be made in Lines 4 through 6, for errors can only be made on the even numbered lines. Odd numbered lines represent the spaces between the lines of

ganize. More than 200 enthusiasts attended a similar convention held in 1975 in Gautier. UFO fervor spread in the aftermath of Hickson's alleged adventure aboard

(continued on page 12)

Target Ads
- Turtle Sun Screen
- Rabbit Car Battery

ROCKY WATERS IN 'MAINSTREAM'

By Karen M. Thomas

Plans to place more special education students sided by side with their

brought her in the house that night, I thought, 'Oh, no, that's all we need. Within a couple of hours the puppy and I were bosom buddies.' A few months later * Sellers and his wife took their dogs to the park. It was there that Sellers discovered Zulus true talent. "My wife and I were playing frisbee while the dogs rested. Then, one time when I threw the frisbee to my wife I saw Zulu streaking by and leaping high in the air coming down with the frisbee in

	Mean Number of Errors			
	Pre	Att	Cntrl	
Before-Before Section	.625	.719	.719	p=ns
Before Section	.500	.969	.563	p<.02
During Section	.719	.750	.594	p=ns
After Section	.656	.625	.688	p=ns

Pre = Preattentive Processing Group
Att = Attentive Processing Group
Cntrl = Control Group

* Line where those in the Attentive Processing Group claimed to have shifted their attention to the Target ads.

FIG. 3.4. Errors made with the cursor-moving task: An indication of shifts of attention.

their attention to the target ads in any of these portions of the processing task. Combined, these results suggest that those subjects in the attentive processing group shifted their attention to each target ad once while completing the processing task, whereas those in the preattentive group did not shift their attention to the targets ads at all.

The recognition results further support these findings. Chi-square tests indicate that a greater percentage of subjects in the attentive processing group (100%) claimed to recognize the target ads versus those in the preattentive processing group (25%) and control group (28.1%, χ^2 both > 22, $ps < .001$). Thus, consistent with the error rate data, these results suggest that only those subjects in the attentive processing group shifted their attention to the target ads while completing the processing task.

Testing the Hypotheses

Our first hypothesis states that processing an ad in a preattentive manner would create an implicit memory trace for the brand. ANOVAs were run for each of the two picture fragment measures with group (attentive, preattentive, and control) as the independent variable. Results indicate that group had no effect on the picture fragment completion measures, $F = 1.89, p > .16$ for Rabbit and $F = .03, p > .90$ for Turtle). Thus, the first hypothesis was not supported.

It is thought that a lack of support for this hypothesis might be due to the implicit memory measure itself, and not the theory. Specifically, if this measure was valid, one would expect to find a priming effect with the attentive processing group. For this reason, the other two hypotheses were examined despite the lack of support for the first one.

The second hypothesis examines the effect of preattentive processing on ad and brand attitude. Differences were found in ad attitude between the Rabbit ad ($X = 5.97$) and Turtle ad ($X = 5.20$), $t = 3.16, p < .003$, and thus the two ads were analyzed separately. ANOVAs indicate that group had no effect on subjects' attitude toward the Rabbit Car Battery ad, $F = .807, p > .40$, but did for the Turtle Sun Screen ad, $F = 3.54, p < .04$. A contrast indicates that those in the preattentive processing group ($X = 5.72$) evaluated this ad more positively than those in the control group ($X = 4.28$), $t = 2.39, p < .02$. Thus, the first part of our second hypothesis was partially supported. An ANOVA on brand attitude indicates that group has no effect on brand attitudes, $F = 1.12$, $p > .30$. Thus the second part of this hypothesis was not supported.

The final hypothesis examines ad and brand attitude under conditions of preattentive versus attentive processing and suggests that ads processed in a preattentive manner may be evaluated equally or more favorably than ads processed in an attentive manner. Because no effect was found for group in conjunction with the Rabbit Car Battery ad, analysis of ad attitude focuses on the ad for Turtle Sun Screen. Contrasts indicate that those in the preattentive processing group ($X = 5.72$) evaluated the ad as highly as those in the attentive processing group ($X = 5.59$), $t = .826, p > .80$, and that both of these groups evaluated the ad more highly than those in the control group ($X = 4.28$; both $ps < .05$). Thus, support was found for the first part of this hypothesis. Because no effect was found for group on brand attitude, brand attitude was not analyzed to test the second part of the final hypothesis.

Matching Activation

Because only minimal support was found for many of the hypotheses, further examination of previous theories investigating the effects of preattentive processing on ad attitude was undertaken in an attempt to find mediating or moderating variables that can affect the preattentive processing—affect relationship. Previous research investigating this relationship suggests that match-

ing activation may affect the likelihood of forming a mental representation of the preattentively processed material (see Janiszewski, 1993). Matching activation states that the availability of processing resources of one hemisphere of the brain can be increased with an increased use of processing resources of the opposing hemisphere. Thus, if a subject were completing a task primarily requiring use of the left hemisphere (e.g., reading an article), the availability of processing resources in the right hemisphere would increase in anticipation of an increased processing load. The increased availability of resources in the right hemisphere would then increase the likelihood that information (e.g., a picture) initially sent to the right hemisphere would be processed.

When completing the processing task in this study, subjects could have used primarily right or left hemispheric resources depending on whether they concentrated more of their efforts on maneuvering the cursor (a right hemisphere task) or reading the article (a left hemisphere task). According to matching activation theory, subjects who devoted a greater amount of their efforts to reading the article would have a larger amount of right hemispheric resources available for processing, and given that the processing of pictorial information is thought to be primarily compatible with the right hemisphere versus the left hemisphere, these subjects would then have an increased likelihood of preattentively processing the pictorial ads.

Responses to the distraction task performed after completing the processing task allow us to divide subjects into those who used relatively more versus less left hemispheric resources when completing the processing task. One part of the distraction task involved having subjects write down what they could remember about the article they read in the computerized magazine. A greater number of facts recalled is one indication that a subject used relatively more left hemispheric resources when completing the processing task, and thus had a relatively greater amount of right hemispheric resources available to process the pictorial ads preattentively.

One of the researchers and an assistant, both blind to the experimental conditions, coded subjects' responses to this question as to the number of correct facts mentioned from the article (intercoder reliability = 94%). Discrepancies were discussed among the two coders until a resolution was reached. The mean number of correct facts recalled was 3.07, with the mode also equaling 3.[2] This variable was then made into a dichotomous variable with zero to three correct facts recalled given a code of 1, and four or more facts recalled given a code of 2. A code of 1 (2) indicates a relatively low (high) amount of left hemispheric resources being used when completing the processing task and

[2]The specific question asked in the distraction task was to briefly describe the article by writing down the central idea of the article, what events occurred, and the names of the central characters. Because of the way the question was worded, and because the article was mostly descriptive, there were not a large number of facts that could be recalled.

thus a relatively low (high) level of right hemispheric resources available for processing the pictorial ads.[3]

Analyses were rerun on the attitude measures with group and hemisphere as the independent variables. Matching activation would predict a two-way interaction between group and hemisphere, with a greater effect on the ad and brand attitude measures from high versus low left hemisphere subjects in the preattentive processing group.

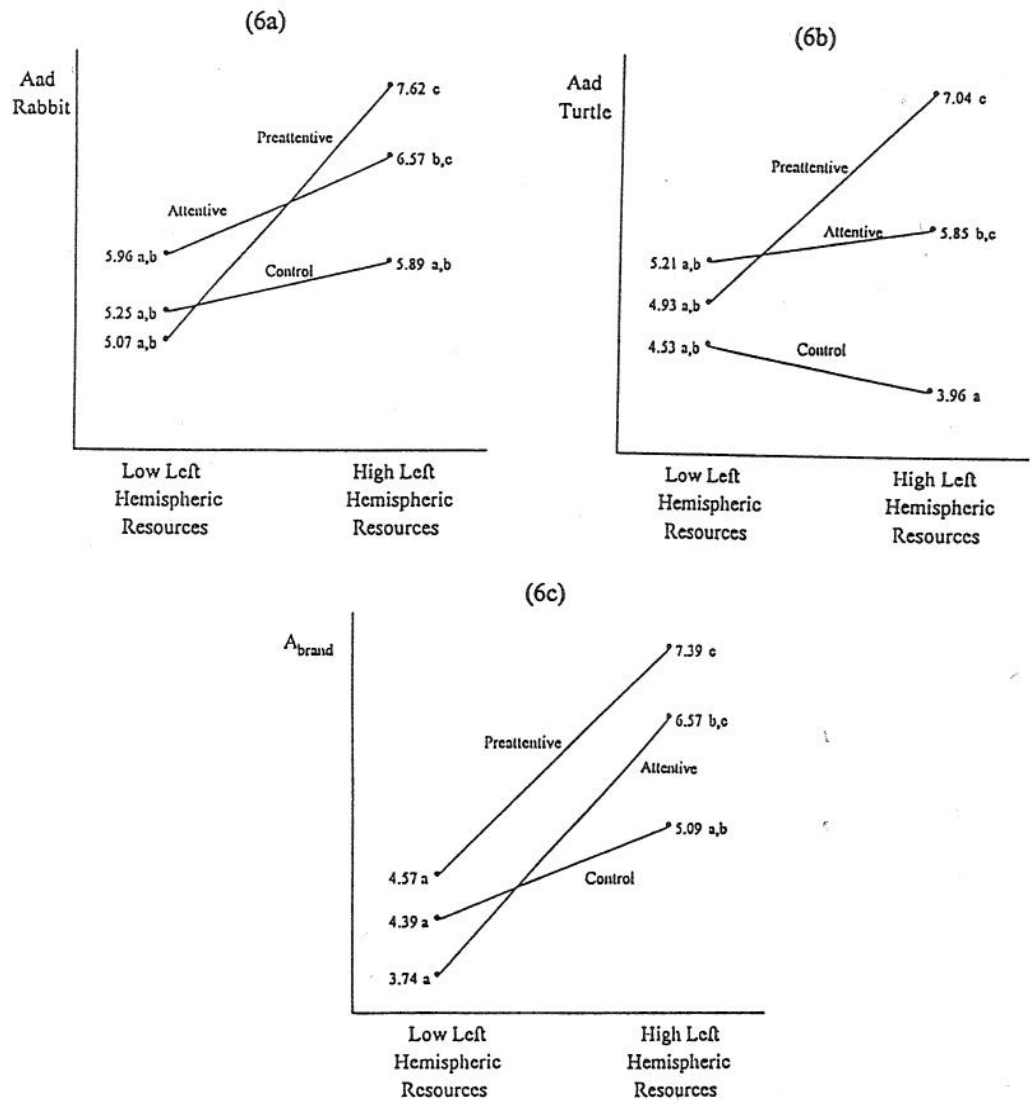
The results are consistent with the theory of matching activation. The results of the ANOVAs for ad and brand attitude are depicted graphically in Fig. 3.5. Ad attitude is higher for those in the preattentive processing group classified as using a relatively high versus low amount of left hemispheric resources when completing the processing task ($X = 7.62$ vs. 5.07 for the Rabbit Car Battery ad, and 7.04 vs. 4.93 for the Turtle Sun Screen ad, both $ps < .05$). Similar results were found for brand attitude ($X = 7.39$ in the high and 4.57 in the low left hemispheric resource condition, $p < .05$).

This analysis also provides support for our last two hypotheses. Those in the preattentive processing group who used a relatively high amount of left hemispheric resources when completing the processing task evaluated the ads and brands more favorably compared to those in the control group (for Rabbit Car Battery $X = 7.62$ vs. 5.53, for Turtle Sun Screen $X = 7.04$ vs. 4.28, for brand attitude $X = 7.39$ vs. 4.70, all $ps < .05$). This result supports our second hypothesis.

Additionally, those in the preattentive processing group who used a relatively high amount of left hemispheric resources when completing the processing task also evaluated the ads more favorably compared to those in the attentive processing group (for Rabbit Car Battery $X = 7.62$ vs. 6.32 and for Turtle Sun Screen $X = 7.04$ vs. 5.59, all $ps < .05$). These results provide support for the stronger version of our final hypothesis (that ads processed preattentively will be evaluated more highly than ads processed attentively).

Results for brand attitude support the weaker version of the last hypothesis (that attitudes are equivalent for preattentively vs. attentively processed brands). Because of differences between the high and low left hemisphere conditions in the attentive processing group with brand attitude (see Fig. 3.5), the conservative comparison of interest is the difference in brand attitude between the preattentive and attentive processing groups in the high left hemisphere condition. Results indicate no differences between these two groups ($X = 7.39$ in the preattentive processing group and $X = 6.57$ in the attentive

[3]Further analyses were conducted on the low and high left hemispheric resource conditions in order to rule out any individual differences for accounting for any effects that might be found with the hemisphere variable. Subjects in the low and high left hemisphere conditions did not differ in handedness ($\chi^2 = 1.34, p > .50$), gender ($\chi^2 = .751, p > .3$), visual ($t = 1.60, p > .10$), or verbal ($t = 1.0, p > .92$) style of processing, video game experience ($t = .63, p > .535$), ad recognition ($\chi^2 = .045, p > .80$) or error rate in any of the four sections analyzed (all $ps > .10$). Thus, any differences found between the two hemisphere conditions



Means with different letters are significantly different from one another at $p < .05$

FIG. 3.5. Attitude toward the ad and brand by the extent of left hemispheric resources utilized while performing the processing task.

processing group, $p > .05$). Hence, those brands that were attentively processed were evaluated as highly as those that were preattentively processed.

DISCUSSION

The validation of the method used in this study is important in that it contributes significantly to our future study of preattentive processing. This method has been found to foster preattentive processing of advertisements while simultaneously providing an online measure of where subjects are devoting their attentional resources. Without a method such as the one used in this

study, which provides clear evidence that the target ads are unattended, it is difficult to attribute any findings to preattentive versus attentive processing.

Additionally, support of the preattentive processing–affect relationship using this more rigorous method lends more credence to the importance of studying preattentive processing. This is particularly so because it was found that under certain conditions, preattentive processing leads to more favorable ad evaluations than attentive processing.

Additional research, however, is warranted to ascertain the strength, duration, and effects of preattentive processing before any managerially useful recommendations can be made about whether and how to develop advertising effectiveness measures that capture the effects of preattentively processed advertisements. To this end, research is presently being conducted that examines whether preattentively processed ads can affect subjects' purchase processes. Specifically, the authors are using the same computerized method as they used in this study, but are examining the effect of preattentively processed ads on consideration set formation rather than attitude change. It is thought that similar research should be conducted in the future manipulating ad content, time between exposure and test, number of ad exposures, and the extent of competitive ad interference in order to better understand the boundaries of the preattentive processing effect.

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