



Cue Representation and Selection Effects of Arousal on Persuasion

Michel Tuan Pham

The Journal of Consumer Research, Volume 22, Issue 4 (Mar., 1996), 373-387.

Stable URL:

<http://links.jstor.org/sici?sici=0093-5301%28199603%2922%3C373%3ACRASEO%3E2.0.CO%3B2-O>

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at <http://www.jstor.org/about/terms.html>. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

The Journal of Consumer Research is published by Journal of Consumer Research Inc.. Please contact the publisher for further permissions regarding the use of this work. Publisher contact information may be obtained at <http://www.jstor.org/journals/jcr-inc.html>.

The Journal of Consumer Research
©1996 The University of Chicago Press

JSTOR and the JSTOR logo are trademarks of JSTOR, and are Registered in the U.S. Patent and Trademark Office. For more information on JSTOR contact jstor-info@umich.edu.

©2002 JSTOR

Cue Representation and Selection Effects of Arousal on Persuasion

MICHEL TUAN PHAM*

A popular prediction in persuasion research is that decreased ability to process information increases reliance on peripheral cues and decreases reliance on central claims. This article explains why this prediction does not necessarily hold when processing capacity is impaired by high arousal. Three experiments suggest that two types of processes underlie arousal effects on persuasion. Arousal induces selective processing of cues that are diagnostic at the expense of cues that are nondiagnostic—the selection effect. Arousal may also dilute the influence of cues that are capacity demanding—the representation effect. It is therefore important to disentangle the diagnosticity of persuasion cues from their processing demands.

Imagine a group of individuals watching *Monday Night Football* on television. They are from San Francisco and are very excited about tonight's game, the 49ers versus the Chiefs. The game is very close; the 49ers are trailing by three points. Then, with seven minutes left, Jerry Rice, the 49ers' wide receiver, catches a 35-yard pass. Touchdown! The individuals are exhilarated, yelling and giving each other high fives. The network now shows a commercial for a new car. The commercial advertises the car's numerous safety features and its sophisticated engineering. A basketball star is shown standing by the car, observing it with fascination. Suppose that these individuals watch the commercial. How will they process it given their intense emotional state?

Previous research has suggested that factors that reduce processing capacity, such as high arousal, will increase reliance on peripheral cues and decrease reliance on central claims (Petty and Cacioppo 1986; Sanbonmatsu and Kardes 1988). This line of research suggests that the aroused viewers in the opening example would be more influenced by the basketball star's fame and less influenced by the product claims than would individuals who are less aroused. This article explains why this is not necessarily the case.

*Michel Tuan Pham is assistant professor of business at the Graduate School of Business, Columbia University, 515 Uris Hall, New York, NY 10027. He is grateful to Rich Lutz and John Lynch for their invaluable guidance at every stage of this project, and to Joel Cohen, Susan Fournier, Gita Johar, Bernd Schmitt, and the reviewers and editors for helpful comments. The author also appreciates the help of Steve Holden, Thom Thurstone, and especially Luk Warlop in collecting the data. The support of the Intercollegiate Center for Management Sciences (ICM, Brussels) and of the University of Florida's marketing department is gratefully acknowledged.

AROUSAL, IMPAIRED CAPACITY, AND THE PERIPHERAL ROUTE

Arousal is a feeling state of activation, varying from drowsiness to frantic excitement (Mehrabian and Russell 1974). It is associated with intense emotional experiences (e.g., watching a frightening movie) and with characteristics of the environment (e.g., being in a crowded bar), physical exertion (e.g., working out), and drug intake (e.g., caffeine). Although there has been debate about whether different antecedents of arousal (e.g., emotions or drugs) lead to the same kind of arousal, there is ample evidence that they all impair working memory capacity (Eysenck 1982; Humphreys and Revelle 1984). How does this reduced capacity affect the way consumers process advertising?

The Elaboration Likelihood Model (ELM; Petty and Cacioppo 1986) provides a useful framework for predicting how high arousal modifies the influence of persuasion cues (Sanbonmatsu and Kardes 1988). All things being equal, the ELM predicts that consumers whose ability to process information is low are likely to follow a "peripheral route" to persuasion, forming evaluations based on simple cues (e.g., endorser status). In contrast, consumers whose ability to process information is high are more likely to follow a "central route" to persuasion, relying on careful examination of the message arguments. If applied to arousal effects, the ELM would predict that arousal (because it reduces processing capacity) will increase the influence of peripheral cues and decrease the influence of central arguments—predictions supported in the Sanbonmatsu and Kardes (1988) study. In the next section, however, I explain why aroused consumers are not necessarily more sensitive to peripheral cues and less sensitive to the message content.

REVISITING THE EFFECTS OF AROUSAL

I propose that the overall effect of arousal on persuasion may be driven by two types of processes: (1) the selection effect, which tends to increase the influence of cues perceived to be diagnostic, and (2) the representation effect, which tends to dilute the influence of cues that are capacity demanding. While the present research does not examine the temporal sequence of these effects, general information-processing principles suggest that the selection effect should precede the representation effect.

The Selective Processing Hypothesis

I suggest that aroused consumers first attempt to cope with their impaired capacity by selectively processing certain cues at the expense of others. Extensive research in the arousal and performance literature shows that arousal induces an attention-narrowing process (see Eysenck [1982] for a review). Furthermore, I propose that aroused consumers select which cues to process on the basis of their information value or, to use accepted terminology, their diagnosticity (e.g., Lynch, Marmorstein, and Weigold 1988). In other words, faced with impaired capacity, aroused consumers tend to selectively process cues that have high information value at the expense of cues that have little information value. This "selective processing hypothesis," first proposed by Easterbrook (1959), accounts for the robust finding that in dual task studies performance on the secondary task declines under high arousal, whereas performance on the primary task is unaffected or improved (e.g., Bursill 1958). As a result, in a persuasion context, high arousal may increase the influence of diagnostic cues on attitudes and decrease the influence of nondiagnostic cues on attitudes—the selection effect.

Although the selective processing hypothesis has never been tested in a persuasion context, the underlying principle has received extensive support in the arousal and performance literature (e.g., Agnew and Agnew 1963; Bacon 1974; Hockey 1973). For instance, Hockey (1973) had subjects monitor the functioning of three fictitious machines and take immediate corrective action when there was something wrong with any one of them. Subjects could check the status of each machine by sampling among three sources of information. As predicted, noise-induced arousal produced increased sampling of the source associated with the highest fault probability, that is, the source that was the most diagnostic. I observed a similar effect of arousal on attention to billboards embedded in a sports event (Pham 1992). The selective processing hypothesis is also consistent with research on decision making that suggests that individuals often attempt to reduce the processing strain associated with trade-offs by basing their choice on the

most important attributes (e.g., Tversky, Sattath, and Slovic 1988).

Selective processing has been observed both in settings where the relative relevance of the cues was suggested a priori (i.e., top down) and in settings where subjects had to infer which cues were more diagnostic (i.e., bottom up). In dual task studies (e.g., Bacon 1974; Bursill 1958), because one task is presented as being more important than the other, subjects have prior beliefs about the relative relevance of the cues. However, the Hockey (1973) study, discussed earlier, suggests that aroused individuals may also rely on bottom-up impressions of the diagnosticity of the cues. I suggest that in persuasion settings, aroused consumers may similarly rely on both preconceived and a posteriori impressions of the relative diagnosticity of the cues (see Goldstein [1990] for a related distinction between general and local importance).¹

Research in the judgment literature suggests two major antecedents of the a priori diagnosticity of a cue: its typical diagnosticity and the consumer's processing goal. Typical diagnosticity refers to the fact that for a given judgment task, certain inputs are generally considered more useful than others across a variety of contexts (Hilton and Fein 1989). For example, across product categories and advertising contexts, performance claims are generally more predictive of the product's value than an endorser's attractiveness. A cue's perceived diagnosticity also depends on the consumer's processing goal (Einhorn and Hogarth 1986; Martin and Achee 1992). For instance, while performance claims may have higher information value for a consumer whose goal is to evaluate the advertised brand, "peripheral" cues may have higher information value for a consumer whose goal is to assess the ad's execution. Therefore, while aroused consumers with a brand-evaluation goal might selectively process product claims at the expense of execution cues, aroused consumers with an ad-evaluation goal might do the reverse.

A persuasion cue may have a perceived information value that differs from its a priori diagnosticity. For instance, the perceived diagnosticity of a cue may also depend on its ability to discriminate among alternatives, that is, in its variability across alternatives (Slovic and Lichtenstein 1971; Zukier 1982). If aroused consumers notice that certain cues are more discriminant than others, they may focus on the former at the expense of the latter. Focusing on the more discriminant cues would spare them the effort of elaborating on the less

¹While relying on preconceptions of diagnosticity should be an easy way of selecting which cue to process, inferring diagnosticity from the data presumably requires more processing capacity. Therefore, there may be a trade-off between the amount of processing resources needed to assess diagnosticity and the amount of resources required to process *all* the cues. It is also possible that when extreme arousal prevents bottom-up assessment of the diagnosticity of the cues, people select cues primarily on the basis of their prior beliefs.

discriminant ones as well as integrating their evaluative implications.

The Representation Hypothesis

While aroused consumers may attempt to circumvent their capacity impairment through selective processing, this impairment may still interfere with subsequent stages of the persuasion process, especially if it is severe or arousal is very high. High arousal has been found to result in lower levels of processing and decreased elaboration of information (e.g., Mueller 1979; Schmeck and Spofford 1982), which affects how this information is represented (Eysenck 1982). Highly aroused people may have incomplete or less veridical representations of the original information. As a result, in persuasion contexts, aroused consumers may fail to correctly extract the evaluative implication of cues that they did not manage to process deeply enough—especially cues that require substantial processing capacity.

Thus, I suggest that a second effect of arousal on persuasion is to dilute the influence of capacity-demanding cues such as complex product claims. Claims that are objectively strong may be encoded as weaker than they actually are, while claims that are objectively weak may be encoded as stronger than they actually are. In other words, insufficient elaboration may cause objectively strong (or weak) sets of claims to regress to the mean in aroused consumers' subjective scales, thereby diluting the claims' influence on persuasion. I call this a representation effect. Indeed, Sanbonmatsu and Kardes (1988, n. 3) observed that high arousal significantly reduced the effect of their claim strength manipulation on subjects' subjective assessment of the product claims.²

Therefore, two characteristics of a cue seem to be critical in persuasion under arousal-impaired capacity: (1) its diagnosticity, which affects whether it will be selectively processed, and (2) its processing demand, which affects whether or not it will be correctly represented. These two dimensions are usually confounded in studies that contrast "peripheral" cues and "central claims," which makes it difficult to predict arousal effects using the ELM. In order to better understand arousal effects, it is necessary to manipulate the diagnosticities of the cues independent of their processing demands. This strategy, which helps disentangle selection and representation effects, was used in the following three experiments.

²Although the selection and representation effects are presented as being conceptually distinct, they are not completely independent. Selective processing, to some degree, influences how the cues are represented. It is also possible that high arousal leads people to selectively process diagnostic cues but in a misrepresented way.

EXPERIMENT 1

This experiment tests the propositions that (1) arousal induces selective processing of diagnostic cues, and (2) as a result, it may increase the influence of product claims and decrease the influence of peripheral cues on persuasion. To test these propositions, the diagnosticity of two cues that have different levels of processing demands—a set of product claims and an endorser—was manipulated. By definition, cues that discriminate among alternatives have higher information value or diagnosticity than cues that do not (Beyth-Marom and Fischhoff 1983). Therefore, the perceived diagnosticity of a cue depends on its variability across alternatives (Slovic and Lichsteinstein 1971; Zukier 1982). If the level of a cue (e.g., endorser status) does not vary across alternatives (advertised brands), this cue will have little information value compared with a cue whose level displays wide variation across alternatives. This determinant of diagnosticity should be especially critical when the need to discriminate among alternatives is high, such as in choice tasks (Payne 1982).

In this experiment, aroused and unaroused subjects were assigned a brand-evaluation task that required them to discriminate among three advertised brands. While claim strength should a priori be more diagnostic than endorser status for brand evaluation, the cues' perceived diagnosticity should a posteriori also depend on their variability across the three brands. It was predicted that aroused subjects would ease their task by relying on the cue that discriminated well among the three brands, while ignoring the cue that did not.

Method

Subjects were exposed to three print ads (one target and two context ads) for dictionaries. Four factors were manipulated: the level of arousal (low or high), the claim strength of the target ad (weak or strong), the endorser status of the target ad (expert or nonexpert), and the relative diagnosticity of claim versus endorser information (high for claims and low for endorser, or low for claims and high for endorser). As in Sanbonmatsu and Kardes (1988), a physical exercise manipulation of arousal was used for two reasons. First, an emotional manipulation (e.g., showing a frightening movie) would confound the effects of arousal with the effects of valence (e.g., negative feelings) and with the effects of the stimulus's content (e.g., the movie plot). Second, exercise-induced arousal has the same effect on processing capacity as emotional arousal does.

Procedure

Subjects were 288 undergraduates who were randomly assigned to one of 16 conditions in a 2 (arousal) \times 2 (claim strength) \times 2 (endorser status) \times 2 (diagnosticity) between-subjects design. The experiment was

TABLE 1
EXPERIMENT 1: DESIGN OF THE DIAGNOSTICITY MANIPULATION

Endorser status	High claim diagnosticity		High endorser diagnosticity	
	Weak arguments	Strong arguments	Weak arguments	Strong arguments
Low expertise	Context 1 (Spencer): average arguments, nonexpert endorser	Context 1 (Spencer): average arguments, nonexpert endorser	Context 1 (Spencer): weak arguments, average endorser	Context 1 (Spencer): strong arguments, average endorser
	Target (Hudson): weak arguments, nonexpert endorser	Target (Hudson): strong arguments, nonexpert endorser	Target (Hudson): weak arguments, nonexpert endorser	Target (Hudson): strong arguments, nonexpert endorser
	Context 2 (Davis): strong arguments, nonexpert endorser	Context 2 (Davis): weak arguments, nonexpert endorser	Context 2 (Davis): weak arguments, expert endorser	Context 2 (Davis): strong arguments, expert endorser
High expertise	Context 1 (Spencer): average arguments, expert endorser	Context 1 (Spencer): average arguments, expert endorser	Context 1 (Spencer): weak arguments, average endorser	Context 1 (Spencer): strong arguments, average endorser
	Target (Hudson): weak arguments, expert endorser	Target (Hudson): strong arguments, expert endorser	Target (Hudson): weak arguments, expert endorser	Target (Hudson): strong arguments, expert endorser
	Context 2 (Davis): strong arguments, expert endorser	Context 2 (Davis): weak arguments, expert endorser	Context 2 (Davis): weak arguments, nonexpert endorser	Context 2 (Davis): strong arguments, nonexpert endorser

NOTE.—Target ads were embedded among context ads given above and below target ads in column.

presented as two unrelated studies conducted by different experimenters in separate rooms.

The “first” study, purportedly about the effects of physical exercise on memory, provided a guise for the arousal manipulation (to be described shortly). After a first association task (where subjects were asked to list products that come to mind in different situations), all subjects performed a physical exercise, followed by a second association task. They were then directed to the “second” study.

In the second study, subjects were given two and a half minutes to read three ads for three dictionaries, with a brand-evaluation goal that emphasized discrimination. They had to evaluate each of the three dictionaries in order to recommend one of them to a friend. The three ads appeared in the same fixed order: The target ad, Hudson, was presented second and the two contextual ads, Spencer and Davis, were presented in first and third positions, respectively. Each ad featured a male endorser and five claims. After exposure to the ads, subjects completed a three-minute filler task during which their arousal was expected to return to a baseline level, before the dependent measures were taken.

Manipulations

Endorser Status and Claim Strength. In the expert endorser conditions, the target ad featured the picture of an alleged professor of English literature at Harvard University. In the nonexpert endorser conditions, the target ad featured the picture of a healthy young man,

described as a fitness instructor. In the weak claims conditions, the Hudson dictionary was supported by claims such as “About 35,000 entries and 43,000 definitions” and “New jacket approved by college students.” In the strong claims conditions, the product was described by claims such as “Almost 200,000 entries and 240,000 definitions” and “Detailed guidance on synonyms, antonyms, spelling, pronunciation, and special usage notes to help to choose the proper word every time.”

Diagnosticity. Twelve different ads (four versions per dictionary) were combined to form eight experimental conditions, detailed in Table 1. In the high claim diagnosticity conditions, the claims of the target ad (Hudson) were made diagnostic by embedding the ad among context ads (Spencer and Davis) with claims of dissimilar strength. The endorser of the target ad (Hudson) was made nondiagnostic by having persons with similar status endorse the context ads (Spencer and Davis). Therefore, in the high claim diagnosticity conditions, the three ads displayed large variance across dictionaries with respect to claim strength and small variance across dictionaries with respect to endorser status.

In the high endorser diagnosticity conditions, the endorser of the target ad was made diagnostic by embedding the ad among context ads endorsed by persons with status dissimilar to the Hudson endorser's. The claims of the target ad were made nondiagnostic by embedding the ad among context ads with claims of

similar strengths. Therefore, in the high endorser diagnosticity conditions, the three ads displayed large variance across dictionaries with respect to endorser status and small variance across dictionaries with respect to claim strength. In summary, in each diagnosticity condition, one type of cue (endorser status or claim strength) had levels very dissimilar (diagnostic) across the three dictionaries while the other type of cue had levels very similar (nondiagnostic) across the three dictionaries.

Arousal. Experience with the physical task was kept constant across conditions by having all subjects perform the Clark, Milberg, and Ross (1983) exercise, which consists of stepping on and off a block for seven minutes. Low-arousal subjects began reading the ads eight to nine minutes after completing the exercise at 55 full steps per minute. High-arousal subjects began reading the ads only three to four minutes after completing the exercise at 65 full steps per minute.

Dependent Measures

First, subjects were asked to recall the name of each dictionary. They were then asked to recommend one of the three dictionaries. Next, they reported their intention to purchase each dictionary on a 1 (definitely would not buy) to 5 (definitely would buy) scale. The main dependent variable was brand attitude toward the target dictionary. Subjects evaluated each dictionary on three seven-point scales anchored by bad/good, unsatisfactory/satisfactory, and unfavorable/favorable ($\alpha = 0.98$). Finally, subjects completed manipulation checks of claim strength and of endorser status.

Results

Manipulation Checks

Claim Strength. Subjects were given a copy of each set of claims they had been exposed to and were asked to rate the claims on a seven-point scale (1 = very unpersuasive; 7 = very persuasive). As expected, the target ad's claims were judged more persuasive in the strong ($\bar{X} = 5.74$) than in the weak claim conditions ($\bar{X} = 3.26$; $F(1,272) = 289.19, p < .001$).

Endorser Status. Each endorser was evaluated on three seven-point scales anchored by the following: definitely not an expert/definitely an expert, poor endorser/strong endorser, not credible at all/very credible ($\alpha = .99$). Again, these evaluations were not made from memory; subjects were given the pictures and descriptions of the endorsers. The target ad endorser was judged more favorably in the high-status ($\bar{X} = 6.21$) than in the low-status conditions ($\bar{X} = 1.66$; $F(1,272) = 1911.98, p = .00$).

Diagnosticity. Evaluations of the three sets of claims and of the endorsers were submitted to split-plot ANOVAs with diagnosticity as a between-subject factor and dictionary (Spencer, Hudson, Davis) as a repeated factor. The analysis suggests that variances in claim strength and in endorser status were manipulated as intended. In the high claim diagnosticity conditions, claim strength displayed large variance across dictionaries (mean squares in the weak and strong claim conditions were 383.02 and 350.26), whereas endorser status had less variance across dictionaries (mean squares in the nonexpert and expert conditions were 103.12 and 181.42). In the high endorser diagnosticity condition, claim strength displayed small variance across dictionaries (mean squares in the weak and strong claim conditions were 16.05 and 21.18), whereas endorser status displayed large variance across dictionaries (mean squares in the nonexpert and expert conditions were 395.78 and 391.61).

Arousal. A manipulation check study was conducted with an independent group of 16 subjects from the same population. It showed that at the time of exposure to the ads, systolic blood pressure (BP), and pulse rate (PR) were higher in the high-arousal condition (BP = 127; PR = 93) than in the low-arousal condition (SBP = 118; PR = 83; $F(1,12) = 4.28, p < .05$, one-tailed). However, when the dependent measures were taken, subjects in the high-arousal condition had returned to a level of arousal similar to that of the low-arousal condition (BP = 117; PR = 90; p 's $> .20$).

Selection Effect on Brand Attitude

Attitudes toward the target brand (Hudson) were submitted to a four-way ANOVA (see Table 2). It was hypothesized that aroused subjects would selectively process either the claims or the endorsers depending on these cues' diagnosticities. Therefore, the diagnosticity manipulation should moderate the effects of arousal on the influences of claim strength and endorser status. Two three-way interactions were thus anticipated: a claim strength \times arousal \times diagnosticity interaction and an endorser status \times arousal \times diagnosticity interaction.

Arousal and the Influence of Claim Strength. As predicted, a significant claim strength \times arousal \times diagnosticity interaction indicated that the effect of arousal on the influence of claim strength was different in the two diagnosticity conditions ($F(1,272) = 5.93, p < .02$). In the high endorser diagnosticity condition, claim strength had a smaller influence (measured as the difference between strong and weak claims; $\bar{X}_{\text{Diff.}}$) under high arousal ($\bar{X}_{\text{Strong}} = 5.31, \bar{X}_{\text{Weak}} = 5.36, \bar{X}_{\text{Diff.}} = -0.05$) than under low arousal ($\bar{X}_{\text{Strong}} = 5.62, \bar{X}_{\text{Weak}} = 4.65, \bar{X}_{\text{Diff.}} = 0.87$; $F(1,272) = 4.43, p < .02$, one-tailed). In contrast, in the high claim diagnosticity condition, claim strength had a slightly (though nonsignificantly)

TABLE 2
EXPERIMENT 1: MEAN BRAND ATTITUDES AS A FUNCTION OF CLAIM STRENGTH, ENDORSER STATUS, AROUSAL, AND DIAGNOSTICITY

	Low arousal			High arousal		
	Weak claims	Strong claims	Difference (strong – weak)	Weak claims	Strong claims	Difference (strong – weak)
High claim diagnosticity:						
Nonexpert endorser	2.83	6.25	3.42	2.32	6.33	4.01
Expert endorser	3.43	6.37	2.94	2.41	5.93	3.52
Difference (expert – nonexpert)	.60	.12		.09	-.40	
High endorser diagnosticity:						
Nonexpert endorser	3.13	5.11	1.98	4.50	4.28	-.22
Expert endorser	6.37	6.13	-.24	6.22	6.33	.11
Difference (expert – nonexpert)	3.24	1.02		1.72	2.05	

larger influence under high arousal ($\bar{X}_{\text{Strong}} = 6.13$, $\bar{X}_{\text{Weak}} = 2.36$, $\bar{X}_{\text{Diff.}} = 3.77$) than under low arousal ($\bar{X}_{\text{Strong}} = 6.31$, $\bar{X}_{\text{Weak}} = 3.13$, $\bar{X}_{\text{Diff.}} = 3.18$; $F(1,272) = 1.79$, not significant [ns]). As indicated by a significant four-way interaction, the claim strength \times arousal \times diagnosticity interaction was itself moderated by endorser status. Although the pattern was the same, this interaction was stronger in the nonexpert endorser condition than in the expert endorser condition.

Arousal and the Influence of Endorser Status. The endorser status \times arousal \times diagnosticity interaction was moderated by claim strength ($F(1,272) = 4.03$, $p < .05$). The predicted three-way interaction was significant when the claims were strong ($F(1,272) = 3.14$, $p < .05$, one-tailed) but not when they were weak ($F(1,272) = 1.33$, ns). Consequently, the endorser \times arousal \times diagnosticity interaction is detailed for each level of claims separately.

When the target ad's claims were strong, arousal affected the influence of endorser status as predicted by the selective processing hypothesis. In the high endorser diagnosticity condition, the influence of endorser status (measured as the difference between expert and nonexpert endorsers; $\bar{X}_{\text{Diff.}}$) was larger under high arousal ($\bar{X}_{\text{Expert}} = 6.33$, $\bar{X}_{\text{Nonexpert}} = 4.28$, $\bar{X}_{\text{Diff.}} = 2.05$) than under low arousal ($\bar{X}_{\text{Expert}} = 6.13$, $\bar{X}_{\text{Nonexpert}} = 5.11$, $\bar{X}_{\text{Diff.}} = 1.02$; $F(1,272) = 2.77$, $p < .05$, one-tailed). In contrast, in the high claim diagnosticity condition, the influence of endorser status was very small under low arousal ($\bar{X}_{\text{Expert}} = 6.37$, $\bar{X}_{\text{Nonexpert}} = 6.25$, $\bar{X}_{\text{Diff.}} = 0.08$) and was nonsignificantly reduced at high arousal ($\bar{X}_{\text{Expert}} = 5.93$, $\bar{X}_{\text{Nonexpert}} = 6.33$, $\bar{X}_{\text{Diff.}} = -0.40$; $F < 1$).

When the target's claims were weak, arousal decreased the influence of endorser status, whether it was diagnostic or not ($F(1,272) = 5.32$, $p < .025$). In both diagnosticity conditions, the endorser's influence under low arousal ($\bar{X}_{\text{Expert}} = 4.90$, $\bar{X}_{\text{Nonexpert}} = 2.98$, $\bar{X}_{\text{Diff.}} = 1.92$) exceeded his influence under high arousal ($\bar{X}_{\text{Expert}} = 4.31$, $\bar{X}_{\text{Nonexpert}} = 3.41$, $\bar{X}_{\text{Diff.}} = 0.90$).

In summary, in the high claim diagnosticity condition, high arousal reduced the influence of endorser status and marginally increased the influence of claim strength. In the high endorser diagnosticity condition, high arousal reduced the influence of claim strength. It also increased the influence of endorser status when the claims were strong. These findings are consistent with the selective processing hypothesis. However, when the claims were weak, high arousal unexpectedly reduced the influence of endorser status in the high endorser diagnosticity condition.

Discussion

Overall, the findings are consistent with the selective processing hypothesis. The effects of arousal on the influences of product claims and endorser status largely depended on which type of cue was made diagnostic. High arousal generally increased the influence of the more diagnostic cue (claim strength or endorser status) and decreased the influence of the less diagnostic cue. While arousal may impair processing capacity, inducing consumers to process fewer cues, it does not necessarily lead them to rely on peripheral ones. If claim strength is perceived to be more diagnostic than endorser status, aroused consumers may in fact selectively process the former and disregard the latter.

When product claims were weak, arousal unexpectedly decreased the influence of endorser status in both diagnosticity conditions. It is possible that when the product claims were weak, the diagnosticity manipulation failed to make the endorser more diagnostic than the claims. Skowronski and Carlston (1987) suggest that negative information (e.g., weak claims) is generally perceived as more diagnostic than positive information. Subjects might have perceived Hudson's weak claims as being more indicative of the product's value than the status of the endorser. Given this explanation, this unexpected result also would be consistent with the selection hypothesis.

Thus this experiment suggests that because of a selection effect, arousal may actually increase the influence of product claims and decrease the influence of peripheral cues such as endorser status on persuasion. To reconcile these findings with Sanbonmatsu and Kardes's (1988) results, the next experiment examines the possibility that when capacity limitations are even more severe, arousal also has a representation effect on persuasion.

EXPERIMENT 2

This experiment tests the proposition that when capacity limitations are very severe arousal may have both selection *and* representation effects on persuasion. While the former effect depends on the diagnosticities of the cues, the latter depends on their processing demands. Again aroused and unaroused subjects were exposed to advertisements varying in claim strength and endorser status. Processing capacity was further constrained by allowing less time to process the ads than in experiment 1.

To triangulate on the diagnosticity construct and provide convergent evidence of the selection effect, the diagnosticity of the cues was manipulated by directing subjects' processing goals. Subjects were instructed either to evaluate the product (brand-evaluation goal) or to evaluate the ads' executions (ad-evaluation goal). It was anticipated that for subjects with a brand-evaluation goal, claim strength would be more diagnostic than endorser status, while for subjects with an ad-evaluation goal, claim strength would be less diagnostic than endorser status. If arousal induces selective processing of the cues perceived to be more diagnostic, the influences of claim strength and of endorser status on persuasion under high arousal should depend in part on subjects' processing goals.

It was further hypothesized that high arousal would also interfere with the encoding of the capacity-demanding claims. As a result, aroused subjects would misconstrue the evaluative implications of the claims, overrating weak ones and underrating strong ones, which would dilute the influence of claim strength on brand attitudes. Arousal was not expected to have a similar representation effect on the influence of endorser status, because this cue should require less capacity.

In summary, it was hypothesized that the overall influence of arousal on brand attitudes would reflect the combined influence of two effects. The representation effect would dilute the influence of claims (but not of the endorsers) in both goal conditions. The selection effect would increase or decrease the influence of the two cues, depending on which cue was made diagnostic given subjects' goals.

Method

Highly aroused or less aroused subjects read two print ads (again for fictitious dictionaries) with either

a brand-evaluation goal or an ad-evaluation goal. While subjects in experiment 1 were given two and a half minutes to process the ads, subjects in this experiment were only allowed 50 or 90 seconds. The actual level of time constraint (50 or 90 seconds) did not have any substantive effect on the results and is not discussed further.

Procedure

Subjects were 133 undergraduates who were randomly assigned to one of eight conditions of a 2 (arousal) \times 2 (goal) \times 2 (time constraint) between-subjects design. Again, the experiment was presented as two unrelated studies. The "first" study and the arousal manipulation were identical to those described in experiment 1. In the "second" study, subjects were given either 50 or 90 seconds to process two ads. After exposure to the ads, subjects completed the same three-minute filler task as in experiment 1, before the dependent measures were taken.

Manipulations

Claim Strength and Endorser Status. In experiment 1, claim strength and endorser status were manipulated between subjects. In this experiment, these two cues were manipulated within subjects across the two (target) ads, which appeared in a fixed order. In the first ad, the Davis dictionary was supported by objectively strong claims (e.g., "Covers as many as 195,000 entries and provides 235,000 definitions") but was recommended by a nonexpert endorser (a store manager). In the second ad, the Hudson dictionary was supported by objectively weak claims (e.g., "About 35,000 entries and 43,000 definitions") but was recommended by an expert endorser (a professor of English literature at Harvard University).

Processing Goal and Diagnosticity. In the brand-evaluation (high claim diagnosticity) condition, subjects were instructed to imagine that they needed to buy an English dictionary and to evaluate the two dictionaries to see whether they were worth buying. In the ad-evaluation (high endorser diagnosticity) condition, subjects were asked to provide suggestions about how an ad agency could improve the ads.

Dependent Measures and Mediators. Attitude toward each ad (A_{ad}) was assessed by four semantic differentials anchored by good/bad, like/dislike, satisfactory/unsatisfactory, and favorable/unfavorable ($\alpha = .95$ for Davis and $\alpha = .93$ for Hudson). Brand evaluations (A_b) were assessed using similar scales ($\alpha = .92$ for Davis and $\alpha = .96$ for Hudson). Purchase intentions were rated on two scales ranging from 1 (definitely not buy) to 5 (definitely buy). Subjects were also asked to provide a detailed description of each ad.

Representation effects were assessed by asking subjects to report memory-based evaluations of the product claims and endorsers. These ratings should be proximally related to the representations of the cues at the time of judgment, because the claims and the endorsers were not reinstated. Each endorser was rated on three semantic differentials: definitely an expert/definitely not an expert, strong endorser/poor endorser, very credible/not credible at all ($\alpha = .94$ for Davis and $\alpha = .92$ for Hudson). Each set of claims was rated on three semantic differentials: not persuasive at all/very persuasive, weak/strong, not convincing/very convincing ($\alpha = .92$ for Davis and $\alpha = .91$ for Hudson).

Results

Demand and Manipulation Checks

Demand Characteristics. Data from two subjects were discarded because debriefing revealed suspicion or carelessness. To further assess demand sensitization, an independent group of 44 subjects was provided with the same processing instructions as subjects in the main experiment and asked about the purpose of the study. It was observed that (1) subjects had a very limited understanding of the objectives of the study, and (2) there was no differential sensitization to the hypotheses between the two processing goal conditions.

Endorser Status and Argument Strength. As expected, subjects evaluated the expert endorser (the Harvard professor, $\bar{X} = 5.59$) more favorably than the nonexpert endorser (the store manager, $\bar{X} = 2.63$; $F(1,123) = 179.34, p < .001$). In contrast, subjects evaluated the strong claims more favorably ($\bar{X} = 5.13$) than the weak claims ($\bar{X} = 3.10$; $F(1,123) = 85.38, p < .001$).

Diagnosticity and Ease of Processing. A manipulation check study ($n = 44$) showed, as expected, that the relative diagnosticity of the claims (compared with the endorsers) was higher in the brand-evaluation condition ($\bar{X} = .97$) than it was in the ad-evaluation condition ($\bar{X} = -0.19$; $F(1,40) = 4.78, p < .04$). The study also revealed that it was more difficult to assess the convincingness of the claims ($\bar{X} = 3.88$) than to assess the convincingness of the endorsers ($\bar{X} = 3.02$; $t = 2.92, p < .01$).

Overview of the Analyses

The main dependent variable was the difference between the evaluation of Davis (strong claims and weak endorser) and the evaluation of Hudson (weak claims and strong endorser). On average, subjects tended to prefer Davis ($A_{b,Davis} - A_{b,Hudson} = 1.52$). Any decrease in this difference suggests decreased relative influence of claim strength or, similarly, an increased relative influence of endorser status. Conversely, an increase of

this difference suggests increased relative influence of claim strength. The selection effect should contribute to an arousal \times goal interaction, while the representation effect should contribute to a main effect of arousal.

The Representation Effect

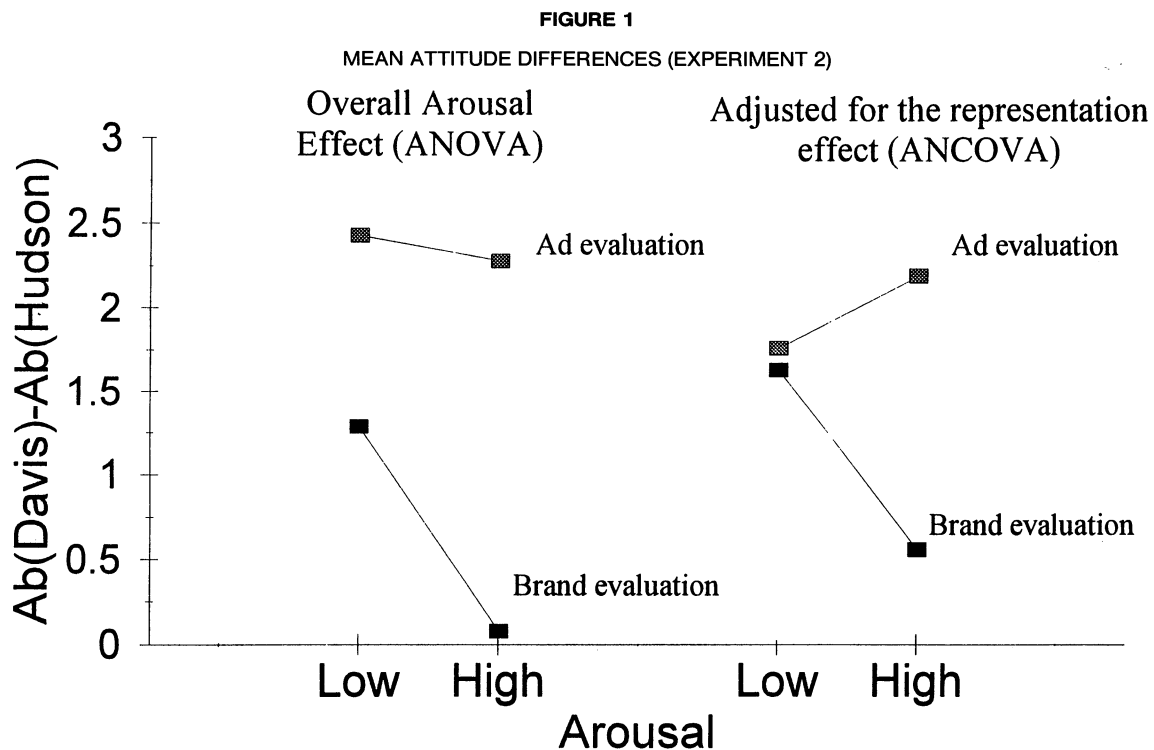
The mean attitude differences (collapsed across the nonsignificant time constraint factor) are depicted in the left-hand panel of Figure 1. A three-way ANOVA revealed a main effect of processing goal ($F(1,123) = 16.27, p < .001$). Attitude difference ($A_{b,Davis} - A_{b,Hudson}$) was greater for subjects with a brand-evaluation goal ($\bar{X} = 2.35$) than for subjects with an ad-evaluation goal ($\bar{X} = 0.67$). More important, there was also a main effect of arousal. Attitude difference was smaller under high arousal ($\bar{X} = 1.88$) than under low arousal ($\bar{X} = 2.11$; $F(1,123) = 3.11, p < .05$, one-tailed). As in the Sanbonmatsu and Kardes (1988) study, arousal seemed to decrease the influence of claim strength (or increase the influence of endorser status).

The representation hypothesis suggests that this main effect of arousal is mediated by the representation of the product claims among highly aroused subjects. It was observed that highly aroused subjects perceived Hudson's objectively weak claims to be stronger ($\bar{X} = 3.30$) than did less aroused subjects ($\bar{X} = 2.89$; $F(1,123) = 2.42, p = .06$, one-tailed). That is, arousal affected the representation of the Hudson claims. It did not, however, affect the representation of the Davis claims.³ To test the mediational role of the representation of the claims, the perceived strength of the Hudson claims was entered as a covariate in an ANCOVA of attitude difference. The mean attitude differences, adjusted for the covariate, are depicted in the right-hand panel of Figure 1. Statistical control of the perceived strength of the Hudson claims removes the main effect of arousal ($F(1,122) = 1.01, p = .32$). Consistent with a representation explanation, the main effect of arousal on attitude difference was mediated by changes in the representation of the Hudson claims.

The Selection Effect

It was hypothesized that in addition to a representation effect, there would be a selection effect of arousal. That is, if the representation effect was controlled, the influence of the persuasive cues under high arousal would depend on their diagnosticity. The ANCOVA results support this hypothesis (see Fig. 1, *right-hand*

³The order in which the ads were presented may be responsible of this lack of parallelism. First, aroused subjects may have attempted to circumvent their capacity limitation by spending more time on the first ad (Davis) and less time on the second (Hudson). Second, the memory load was presumably higher when reading the second ad than when reading the first ad.



panel). When perceived strength of the Hudson claims was accounted for, the effect of arousal was significantly moderated by the processing goal ($F(1,122) = 5.62, p < .05$). When the goal was ad evaluation, arousal reduced the attitude difference ($\bar{X}_{\text{Low}} = 1.63$ and $\bar{X}_{\text{High}} = 0.56; F(1,122) = 5.77, p < .01$, one-tailed). In contrast, when the goal was brand evaluation, arousal increased attitude difference ($\bar{X}_{\text{Low}} = 1.76$ and $\bar{X}_{\text{High}} = 2.19$), though not significantly ($F(1,122) = 1.16, p = .28$). As in experiment 1, these results are consistent with the selection hypothesis. Recall data were also examined to detect any inconsistency with the hypothesized processes.

Effects on Recall

Claim Recall. Two judges counted the number of claims correctly recalled from each ad (interjudge correlations = .86 for Davis and .87 for Hudson). As reported in Table 3, recall of the Davis claims was not affected by arousal. Recall of the Hudson claims, however, displayed an arousal \times processing goal interaction ($F(1,122) = 5.58, p < .05$). Arousal did not affect recall of the Hudson claims in the ad-evaluation condition ($\bar{X}_{\text{Low}} = 1.39, \bar{X}_{\text{High}} = 1.60; F < 1$). In contrast, in the brand-evaluation condition, recall of the Hudson claims was poorer under high arousal ($\bar{X} = 1.86$) than under low arousal ($\bar{X} = 2.48; F(1,122) = 6.58, p < .05$). While other processes (e.g., retrieval) could

have produced similar effects, these results are consistent with the proposition that high arousal interfered with encoding of the Hudson claims in the brand-evaluation condition, resulting in a representation effect.

Endorser Recall. Recall of each endorser was coded on a 0 (cannot recall anything) to 5 (perfect recall) scale (interjudge correlations = .87 for Davis and .86 for Hudson). Because arousal had parallel effects on the recall of the two endorsers, endorser recall scores were summed across dictionaries. A three-way ANOVA revealed an arousal \times goal interaction ($F(1,122) = 6.61, p < .02$). In the brand-evaluation goal condition, highly aroused subjects had lower recall for the endorsers ($\bar{X} = 3.85$) than less aroused subjects ($\bar{X} = 5.03; F(1,122) = 4.33, p < .05$, one-tailed). In the ad-evaluation goal condition, highly aroused subjects had better recall for the endorsers ($\bar{X} = 4.94$) than less aroused subjects ($\bar{X} = 3.95; F(1,122) = 3.02, p < .05$, one-tailed). These results are consistent with a selection effect. High arousal seems to have increased attention to the endorsers when this information was diagnostic and decreased attention to the endorsers when this information was nondiagnostic. These data should be interpreted with caution, however, because recall of a persuasive cue may reflect a variety of processes (e.g., conditions at encoding, integration or elimination during attitude formation, or conditions upon retrieval).

Discussion

Representation and Selection Effects

These findings suggest that the overall effect of arousal on persuasion may be driven by two types of processes. First, aroused consumers are more likely to process the cues that they perceive to be diagnostic and less likely to process those that they perceive to be nondiagnostic. The ANCOVA results (Fig. 1, *right-hand panel*) are consistent with this hypothesis. Arousal increased the influence of endorser status when this cue was diagnostic (ad-evaluation condition) and decreased this influence, although nonsignificantly, when this cue was nondiagnostic (brand-evaluation condition). It was also observed that high arousal increased memory for the endorsers in the ad-evaluation condition and decreased memory in the brand-evaluation condition. Experiments 1 and 2, using very different manipulations of cue diagnosticity, thus provide consistent evidence for the selective processing hypothesis.

In addition, when capacity limitations are severe, arousal may have a representation effect that produces results consistent with those observed by Sanbonmatsu and Kardes (1988). Under high arousal the evaluative strength of capacity-demanding claims may be misrepresented (see Sanbonmatsu and Kardes 1988, n. 3), diluting their influence on persuasion. Consistent with this hypothesis, it was observed that high arousal decreased the relative influence of claim strength on attitudes in both goal conditions (Fig. 1, *left-hand panel*) and that this effect was mediated by the fact that aroused subjects overrated the Hudson claims. The claim recall data were also consistent with this interpretation. Aroused subjects with a brand-evaluation goal had poorer recall of the Hudson claims than did less aroused subjects with the same goal.⁴ Therefore, to predict whether arousal will increase or decrease the influence of persuasion cues, it is important to consider both their diagnosticities (given consumers' goals) and their processing demands.

Limitations and Alternative Explanations

Because the Hudson dictionary (weak claims and strong endorser) was consistently presented second, there is an alternative explanation for the main effect of arousal on attitude difference, which was interpreted as a representation effect. Highly aroused subjects may have displayed a recency bias, evaluating more favorably the dictionary that was more accessible (Hudson). Although this explanation seems plausible, it appears inconsistent with several findings. First, reanalysis of

⁴Because subjects had returned to a baseline level of arousal when the dependent measures (including the ratings of the claims) were taken, the representation effect must have originated in processes occurring during exposure to the ads or shortly afterward.

TABLE 3

EXPERIMENT 2: MEAN CLAIM AND ENDORSER RECALL
AS A FUNCTION OF AROUSAL
AND PROCESSING GOAL

	Processing goal			
	Ad evaluation		Brand evaluation	
	Low arousal	High arousal	Low arousal	High arousal
Davis claims	1.70	1.43	2.53	2.19
Hudson claims	1.39	1.60	2.48	1.86
Endorsers (Davis + Hudson)	3.95	4.94	5.03	3.85

NOTE.—The means are collapsed across the time constraint factor.

both the endorser and claim recall data suggests that high arousal had parallel effects on memory for the two dictionaries. More important, a recency explanation does not account for the finding that the main effect of arousal dissipates when subjects' representations of claim strength are partialled out—a finding consistent with the representation hypothesis.

However, other limitations of the experiment need to be noted. Varying the processing goal had the intended effect on perceived cue diagnosticity. However, this manipulation may have induced higher task involvement in the brand-evaluation condition than in the ad-evaluation condition. One could also argue that this "top-down" manipulation of cue diagnosticity may have been too heavy-handed. Therefore, the evidence for the selective processing hypothesis should not be assessed on the basis of this experiment only, but on the basis of the convergent findings obtained across experiments 1 and 2 with triangulated manipulations of cue diagnosticity. Finally, it is important to explore the generalizability of the findings to other forms of arousal and to provide additional evidence of the underlying processes. Experiment 3 addresses these issues by using a different operationalization of arousal and examining process data.

EXPERIMENT 3

Subjects were exposed to an anxiety-producing situation. Because the experience of anxiety (state anxiety) has a major arousal component (Mandler 1975; Spielberger 1966), it was expected that subjects' anxiety would influence their processing of persuasive messages in the same manner as arousal. To avoid the confound introduced by exposing subjects to different situations, all subjects were put in the same stressful setting: having to present a controversial speech to a potentially hostile audience. Substantial variation in state anxiety was expected across subjects. This construct was therefore

measured and related to the dependent variable and process measures.

Procedure

Subjects were 57 undergraduates who participated in groups of 7–10. After completing a questionnaire that included a trait anxiety inventory (Westhuis and Thyer 1989), subjects were led to believe that they had to improvise a short speech in front of the other participants. The experimenter then introduced a filler task, “to simulate the fact that in real press conferences speakers can rarely brush up their speech.” Subjects were given 50 seconds to read the same two ads as in experiment 2. The first ad (Davis) featured strong claims and a weak endorser; the second ad (Hudson) featured weak claims and a strong endorser. The goal was to evaluate the brands. They then completed a questionnaire and were debriefed.

Measures

Dependent and Process Measures. Subjects reported their attitude toward each dictionary on the same four-item scale as in experiment 2 ($\alpha = .86$ for Davis and $\alpha = .90$ for Hudson). They then listed all the thoughts that came to their minds as they were reading the two ads. They reported their evaluations of each dictionary’s endorser and product claims using the same scales as in experiment 2 ($\alpha = .90$ for Davis endorser; .83 for Hudson endorser; .90 for Davis claims; .90 for Hudson claims). Again, the claims and the endorsers were not reinstated in order to assess representation effects.

Independent and Confounding Measures. State anxiety, the independent variable, was assessed by three items administered at the end of the study: I am relaxed/tense, I am calm/anxious, and I am confident/nervous ($\alpha = .89$). These items have been found to correlate strongly with Lorr’s (1971) tension-anxiety factor and an arousal/activation factor (Morgan and Heise 1988; Shaver et al. 1987). Trait anxiety (Westhuis and Thyer 1989) was measured at the beginning of the session to provide convergent validity to the state anxiety measure. Mood and message involvement were also assessed for confounding checks.⁵

⁵Mood was measured by three items interspersed among the anxiety items (I am in a good/bad mood; I am feeling happy/unhappy; I am pleased/annoyed; $\alpha = .94$). Involvement with the task (processing the message) was measured by four items: I was/wasn’t very motivated to reach an accurate evaluation of the dictionaries; I did/did not put much effort into the evaluation of the products; It was important/unimportant to read the ads carefully; I am confident/not sure that I evaluated the products thoroughly ($\alpha = .76$).

Results

Demand, Manipulation, and Confounding Checks

Demand Characteristics. Although none of them were able to articulate the hypothesis of the study, five subjects had suspicions about the study. Their data and those of a subject who did not complete the independent measure were deleted from further analysis.

Typical Diagnosticity. Product claims were expected to be perceived as typically more diagnostic for brand evaluation than were the endorsers. Subjects expressed their agreement (1 = strongly disagree; 5 = strongly agree) with four items stating that the Hudson (or Davis) claims (or endorser) were “very indicative of how good or bad this dictionary is.” The claims were rated as more diagnostic ($\bar{X} = 3.48$) than the endorsers ($\bar{X} = 2.83$, $t = 4.16$, $p < .001$).

State Anxiety. A factor analysis of the state anxiety, mood, and message involvement items yielded a three-factor solution (74 percent of the variance), in which state anxiety items loaded on factor 1, message involvement items on factor 2, and mood items on factor 3. There was a predictable negative correlation ($r = -.58$) between state anxiety and mood. Although trait anxiety did not correlate with message involvement ($r = -.07$, $p = .50$) or with mood ($r = -.17$, $p = .21$), as expected, it was positively correlated with state anxiety ($r = .34$, $p < .02$). The state anxiety measure thus had good construct validity.

Effects on Brand Attitude Difference

The analysis strategy was similar to that of experiment 2. The main dependent variable was the difference between the attitude toward Davis (strong claims and weak endorser) and the attitude toward Hudson (weak claims and strong endorser). Subjects tended to prefer Davis to Hudson (Mean $A_{b,Davis} - A_{b,Hudson} = 2.01$). Again, an increase in this difference suggests an increase in the relative influence of the claims, while a decrease in this difference suggests an increase in the relative influence of the endorsers.

Regression analyses, with state anxiety as a predictor, were performed on $A_{b,Davis} - A_{b,Hudson}$ (see Table 4). Experiment 2 revealed that misrepresentation of claim strength may obscure the selection effect. Consequently, the representation effect was controlled for by entering perceived claim strengths of the two dictionaries as covariates. After control of the representation of claim strength, state anxiety had a curvilinear effect (Table 4, Eq. [1]) on attitude difference. State anxiety increased the relative influence of product claims up to a point—a trend consistent with the selection effect hypothesis. However, when experienced anxiety reached high levels, the relative influence of the claims decreased.

TABLE 4
EXPERIMENT 3: REGRESSION ANALYSES OF ATTITUDE
DIFFERENCE (DAVIS – HUDSON)

Predictors	Unstandardized coefficient	t	p	R ²
Equation 1:				.52
Intercept	.069	.03	.977	
Covariates:				
Strength of Davis claims	.398	1.46	.151	
Strength of Hudson claims	-.918	-.437	.000	
Anxiety	1.598	2.32	.025	
Anxiety ²	-.181	-2.21	.032	
Equation 2:				.40
Intercept	.985	2.40	.020	
Claim favorability index (CFI)	.616	4.60	.000	
Endorser favorability index (EDI)	1.799	3.07	.004	
EDI × Anxiety	-.400	-3.20	.002	
Equation 3:				.62
Intercept	1.89	.80	.429	
Covariates:				
Strength of Davis claims	.238	.92	.361	
Strength of Hudson claims	-.707	-3.41	.001	
CFI	.326	2.51	.016	
EDI	1.540	2.50	.016	
EDI × Anxiety	-.325	-2.50	.016	
Anxiety	.722	1.03	.309	
Anxiety ²	-.103	-1.29	.204	

NOTE.—t-Tests on the estimates are two-tailed.

Analysis of Cognitive Responses

Two judges classified subjects' thoughts into 10 categories, accounting for 92 percent of the thoughts (interjudge agreement = .87; disagreements were resolved through discussion). The first eight categories classified thoughts as favorable or unfavorable, claim or endorser related, and targeted toward Davis or Hudson. The remaining two categories included nonevaluative claim- and endorser-related thoughts (e.g., listing of the claims).

If aroused consumers attempt to cope with their impaired capacity by selectively processing diagnostic cues and ignoring nondiagnostic cues, this should be reflected at the aggregate level in the regression weights of the thoughts as predictors of brand attitudes. The regression weight of claim-related thoughts should increase and/or the regression weight of endorser-related thoughts should decrease with higher anxiety. Two indices were computed. The claim favorability index (CFI) was obtained by adding the number of support arguments for Davis to the number of counterarguments against Hudson and subtracting the number of counterarguments against Davis and the number support arguments

for Hudson. The CFI should be positively related to $A_{b,Davis} - A_{b,Hudson}$. The endorser-related thoughts were combined in a similar manner to construct an endorser favorability index (EFI) that should also be positively related to $A_{b,Davis} - A_{b,Hudson}$.

Equation (2) (Table 4) indicates that state anxiety interacted significantly with the endorser favorability index in predicting $A_{b,Davis} - A_{b,Hudson}$. Consistent with the selective processing hypothesis, higher state anxiety resulted in a decreased weight of endorser-related thoughts on brand attitudes. To test if this process mediated the increased relative influence of claim strength under moderate anxiety, the predictors of Equations (1) and (2) were entered into a single regression. The analysis (Table 4, Eq. [3]) shows that once selective processing (as reflected by the weights of the thoughts) is partialled out, the positive effect of anxiety on attitude difference dissipates. One can conclude that anxiety increased attitude difference (hence the relative influence of product claims) because it prompted subjects to disregard endorser-related cognitions.

Discussion

This study, using a different manipulation of arousal, partially replicates the selection effects uncovered in the first two experiments. Once claim representation effects are accounted for, higher anxiety increases, up to a point, the relative influence of the more diagnostic cues (product claims) on brand attitudes. The cognitive response analysis suggests that this increased relative influence of the claims is mediated by the fact that endorser status was likely to be discounted by anxious subjects. This finding is consistent with Easterbrook's (1959) proposition that as arousal narrows the range of cue utilization, less diagnostic cues are eliminated first.

At very high levels of anxiety, further anxiety decreased the attitude difference. As in experiment 2, one could argue that very high anxiety induced a recency bias, raising evaluations of the second dictionary. A simpler explanation may be that highly anxious subjects might have had their capacities so disrupted—or were so concerned by the speech—that they engaged in limited processing of both claims and endorsers. As a result, they reported similar evaluations of the two dictionaries.

GENERAL DISCUSSION

The Two Sides of Arousal and the Two Dimensions of a Cue

A popular prediction in persuasion research is that decreased ability to process information increases reliance on peripheral cues and decreases reliance on central claims (Petty and Cacioppo 1986). While previous research (Sanbonmatsu and Kardes 1988) suggests that this prediction may apply to arousal effects, this

research exhibits why this may not always be the case. Instead of regarding cues as either central or peripheral, it is useful to examine them along two dimensions: their processing demand and their diagnosticity. It becomes apparent that the overall effect of arousal reflects the combined influence of two types of processes.

Arousal seems to induce selective processing of cues that are diagnostic at the expense of cues that are non-diagnostic. While most evident in experiment 1, this effect was observed in all three studies, with multiple operationalizations of arousal and of cue diagnosticity. This triangulation gives substantial credence to the principle of cue utilization first proposed by Easterbrook (1959). When processing capacity is reduced, it is sensible to focus on cues that have higher information value. As a result, despite reduced processing capacity, aroused consumers may be more influenced by product claims and less influenced by endorser status than are less aroused consumers—a finding inconsistent with the ELM's notion of peripheral route.

When capacity limitations are severe, arousal may also dilute the influence of cues that are capacity demanding. Experiment 2 suggests that aroused consumers may misrepresent the evaluative implication of product claims, which results in a decreased influence of claim strength on brand attitude. The representation effect is more compatible with previous theorizing about the effects of reduced processing capacity on persuasion.

This research thus identifies conditions under which arousal is likely to increase the influence of product claims and reduce the influence of an execution cue (e.g., an endorser). This is most likely when two conditions are met: (1) claims are perceived to be more diagnostic than the execution cue, and (2) capacity impairment is not severe enough to alter the representation of the claims or to prevent consumers from assessing the diagnosticity of the cues. These conditions were clearly met in the high claim diagnosticity condition of experiment 1.

The research also identifies conditions where the reverse pattern is likely to occur. This is most likely when (1) the execution cue is perceived to be more diagnostic than the claims or (2) capacity impairment is severe enough to dilute the representation of the claims. It is interesting that both conditions may have been met in the Sanbonmatsu and Kardes (1988) study. First, subjects were assigned an ad-evaluation goal. These instructions may have increased the relative diagnosticity of the endorser (see experiment 2). Second, subjects were only allowed 20 seconds per ad. This time constraint, combined with the arousal manipulation, may have placed a more severe burden on subjects' processing capacity, resulting in a representation effect. Sanbonmatsu and Kardes (1988) indeed report that aroused subjects perceived less difference between weak and strong claims than did less aroused subjects.

Finally, this research also specifies conditions under which arousal may have nonlinear effects on persuasion—a relationship reminiscent of the Yerkes-Dodson law of arousal and performance (see also Bodenhausen 1993). Such effects are most likely when there is a negative correlation between the perceived diagnosticity of the cues and their ease of processing, as in experiment 3.

Limitations and Future Research

The effects reported in this research were generally small, yet they were replicated across studies. The overall significance of the selection and representation effects may be assessed by aggregating the observed p -values associated with each of these effects (Rosenthal 1978). When the results of experiment 2 are combined with those of Sanbonmatsu and Kardes, the aggregate significance of the representation effect is one-tailed $p = .0012$. When combined across the three studies of this article, the p -values associated with the selection effect amount to an overall significance of one-tailed $p = .0007$. It is therefore very unlikely that these multiple demonstrations of the selection and representation effects occurred by chance alone.

In essence, the selective processing hypothesis suggests that aroused consumers may be more adaptive in dealing with their impaired capacity than previous research has implied. A legitimate question is whether this apparent adaptivity could be due to some demand characteristics. It would therefore be useful to replicate the research in a setting where selective processing of diagnostic cues would run *against* the experimenter's tacit instructions.

Experiments 1 and 2 used a "content free" exercise manipulation of arousal to isolate the effects of reduced capacity. The generalizability of the findings to emotional arousal was examined in experiment 3, with mixed results. Further assessment of the external validity of this research seems necessary. For instance, one may use an emotional manipulation of arousal, where content and valence would be kept constant while arousal intensity would be manipulated through distraction. An alternative design could build on Mundorf, Zillmann, and Drew's (1991) finding that after several minutes, arousal induced by a disturbing news story ceases to interfere with learning of subsequent commercials. One could place the target ad either immediately after the arousing segment or after a time delay.

One can only form speculations about which aspect of intense emotions is not captured by exercise-induced arousal. One possibility is that exercise-induced arousal does not capture the motivational significance of intense emotions. In addition to restricting processing capacity, intense emotions may redirect consumers' goals (e.g., Mandler 1975). In a setting like experiment 3, for instance, how important can evaluating a dictionary be

to someone who is extremely anxious about an impending speech? Future research on the effects of intense emotions needs to take into account how the emotion-eliciting event and the emotional experience itself influence consumers' motives and processing goals. It is also possible that, because emotionally aroused consumers are likely to ruminate over the emotion-eliciting event, exercise-induced arousal underestimates the actual capacity impairment produced by emotional states.

Finally, it would be interesting to investigate the temporal sequence of the selection and representation effects. The theoretical framework suggests a sequence moving from selective processing to altered representations. This sequence, however, could not be tested in this research. An empirical investigation of this issue would provide significant insight in predicting how different levels of arousal and capacity limitations affect persuasion. A television setting is recommended: The continuous nature of TV commercials makes them more appropriate to study issues of process dynamics; in addition, as our opening suggests, intense arousal may be more likely in television environments.

[Received June 1992. Revised July 1995. Kent B. Monroe and Brian Sternthal served as editors and Joan Meyers-Levy served as guest associate editor for this article.]

REFERENCES

- Agnew, Neil and Mary Agnew (1963), "Drive Level Effects on Task of Narrow and Broad Attention," *Quarterly Journal of Experimental Psychology*, 15 (February), 58-62.
- Bacon, Stephen J. (1974), "Arousal and the Range of Cue Utilization," *Journal of Experimental Psychology*, 102 (January), 81-87.
- Beyth-Marom, Ruth and Baruch Fischhoff (1983), "Diagnosticity and Pseudo-Diagnosticity," *Journal of Personality and Social Psychology*, 45 (December), 1185-1195.
- Bodenhausen, Galen V. (1993), "Emotions, Arousal, and Stereotypic Judgments: A Heuristic Model of Affect and Stereotyping," in *Affect, Cognition, and Stereotyping*, ed. Diane M. Mackie and David L. Hamilton, San Diego, CA: Academic Press, 13-37.
- Bursill, A. (1958), "The Restriction of Peripheral Vision during Exposure to Hot and Humid Conditions," *Quarterly Journal of Experimental Psychology*, 10 (August), 113-129.
- Clark, Margaret S., Sandra Milberg, and John Ross (1983), "Arousal Cues Arousal-Related Material in Memory: Implications for Understanding Effects of Mood on Memory," *Journal of Verbal Learning and Verbal Behavior*, 22 (December), 633-649.
- Easterbrook, J. A. (1959), "The Effects of Emotion on Cue Utilization and the Organization of Behavior," *Psychological Review*, 66 (May), 183-201.
- Einhorn, Hillel J. and Robin M. Hogarth, (1986), "Judging Probable Causes," *Psychological Bulletin*, 99 (January), 3-19.
- Eysenck, Michael W. (1982), *Attention and Arousal, Cognition and Performance*, New York: Springer.
- Goldstein, William M. (1990), "Judgments of Relative Importance in Decision Making: Global vs. Local Interpretations of Subjective Weight," *Organizational Behavior and Human Decision Processes*, 47 (December), 313-336.
- Hilton, James L. and Steven Fein (1989), "The Role of Typical Diagnosticity in Stereotype-Based Judgments," *Journal of Personality and Social Psychology*, 57 (August), 201-211.
- Hockey, Robert (1973), "Changes in Information-Selection Patterns in Multisource Monitoring as a Function of Induced Arousal Shifts," *Journal of Experimental Psychology*, 101 (November), 35-42.
- Humphreys, Michael S. and William Revelle (1984), "Personality, Motivation, and Performance: A Theory of the Relationship between Individual Differences and Information Processing," *Psychological Review*, 91 (April), 153-184.
- Lorr, Maurice (1971), *Manual for the Psychiatric Outpatient Mood Scale (POMS)*, San Diego, CA: Educational and Industrial Testing Service.
- Lynch, John G., Howard Marmorstein, and Michael F. Weigold (1988), "Choice from Sets Including Remembered Brands: Use of Recalled Attributes and Prior Overall Evaluations," *Journal of Consumer Research*, 15 (September), 169-184.
- Mandler, George (1975), *Mind and Emotion*, New York: Wiley.
- Martin, Leonard L. and John W. Achee (1992), "Beyond Accessibility: The Role of Processing Objectives in Judgments," in *The Construction of Social Judgments*, ed. Leonard L. Martin and Abraham Tesser, Hillsdale, NJ: Erlbaum, 195-216.
- Mehrabian, Albert and James Russell (1974), *An Approach to Environmental Psychology*, Cambridge, MA: MIT Press.
- Morgan, Rick L. and David Heise (1988), "Structure of Emotions," *Social Psychology Quarterly*, 51 (March), 19-31.
- Mueller, John H. (1979), "Anxiety and Encoding Processes in Memory," *Personality and Social Psychological Bulletin*, 5 (July), 288-294.
- Mundorf, Norbert, Dolf Zillmann, and Dan Drew (1991), "Effects of Disturbing Televised Events on the Acquisition of Information from Subsequently Presented Commercials," *Journal of Advertising*, 20 (1), 46-53.
- Payne, John W. (1982), "Contingent Decision Behavior," *Psychological Bulletin*, 92 (February), 382-402.
- Petty, Richard E. and John T. Cacioppo (1986), *Communication and Persuasion*, New York: Springer.
- Pham, M. Tuan (1992), "Effects of Involvement, Arousal, and Pleasure on the Recognition of Sponsorship Stimuli," in *Advances in Consumer Research*, Vol. 19, ed. John F. Sherry, Jr. and Brian Sternthal, Provo, UT: Association for Consumer Research, 85-93.
- Rosenthal, Robert (1978), "Combining Results of Independent Studies," *Psychological Bulletin*, 85 (January), 185-193.
- Sanbonmatsu, David M. and Frank R. Kardes (1988), "The Effects of Physiological Arousal on Information Pro-

- cessing and Persuasion," *Journal of Consumer Research*, 15 (December), 379-385.
- Schmeck, Ronald R. and Mark Spofford (1982), "Attention to Semantic versus Phonemic Verbal Attributes as a Function of Individual Differences in Arousal and Learning Strategy" *Contemporary Educational Psychology*, 7 (October), 312-319.
- Shaver, Phillip, Judith Schwartz, Donald Kirson, and Cary O'Connor (1987), "Emotion Knowledge: Further Exploration of a Prototype Approach," *Journal of Personality and Social Psychology*, 52 (June), 1061-1086.
- Skowronski, John J. and Donald E. Carlston (1987), "Social Judgment and Social Memory: The Role of Cue Diagnosticity in Negativity, Positivity, and Extremity Biases," *Journal of Personality and Social Psychology*, 52 (April), 689-699.
- Slovic, Paul and Sarah Lichtenstein (1971), "Comparison of Bayesian and Regression Approaches to the Study of Information Processing in Judgment," *Organizational Behavior and Human Decision Processes*, 6 (November), 649-744.
- Spielberger, Charles D. (1966), "Theory and Research on Anxiety," in *Anxiety and Behavior*, ed. Charles D. Spielberger, New York: Academic Press, 3-20.
- Tversky, Amos, Shmuel Sattath, and Paul Slovic (1988), "Contingent Weighting in Judgment and Choice," *Psychological Review*, 95 (July), 371-384.
- Westhuis, David and Bruce A. Thyer (1989), "Development and Validation of the Clinical Anxiety Scale: A Rapid Assessment Instrument for Empirical Practice," *Educational and Psychological Measurement*, 49 (Spring), 153-163.
- Zukier, Henry (1982), "The Dilution Effect: The Role of the Correlation and the Dispersion of Predictor Variables in the Use of Nondiagnostic Information," *Journal of Personality and Social Psychology*, 43 (December), 1163-1174.