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Vividness Effects: A Resource-Matching Perspective

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The authors present a resource-matching perspective to explain the relationship between vividness and persuasion. Three experiments confirm the predicted inverted-U relationship between resource allocation and persuasion for vivid information, and a positive linear relationship between resource allocation and persuasion for nonvivid information when vivid information is less resource demanding than nonvivid information. This persuasion pattern is reversed in experiment 4, where nonvivid information is less resource demanding than vivid information; that is, there is an inverted-U relationship for nonvivid information, and a positive linear relationship for vivid information. The contrasting persuasion functions for vivid and nonvivid information can predict when vivid information will be more versus less persuasive than nonvivid information.

Marketing communications often include pictorial representations of the product and its use, detailed verbal descriptions of a product's features, and prompts to imagine the personal use of an advertised product. These practices are based on the belief that highly vivid message presentations will enhance the attention paid to a communication and thus increase message persuasiveness (Mathews 1994). Although there is some empirical support for this belief, there is also evidence that vivid and pallid information are equally persuasive or that pallid information is sometimes more persuasive than vivid information.

Investigations examining vividness effects on persuasion typically involve the presentation of a vivid or pallid message under circumstances in which either a few or many resources are available for allocation to message processing. By following these procedures, several different patterns of outcomes have been reported. One outcome is that vivid information is more persuasive than nonvivid information at a low level of resource allocation, but increasing the resources allocated to the message enhances the impact of the nonvivid appeal so that both messages are equally persuasive at a high level of resource allocation (Rook 1987). In other experiments, the finding is that increasing the resources allocated to mes-

sage processing enhances the influence of the vivid information in relation to nonvivid information (McGill and Anand 1989), or that a vivid appeal is more persuasive than a nonvivid message irrespective of the level of resource allocation (Shedler and Manis 1986; Taylor and Wood 1983). Finally, in some studies the observation is that increasing the resource allocation to message processing reduces the impact of the nonvivid presentation so that it approximates that of the vivid communication (Frey and Eagly 1993; Kisielius and Sternthal 1984, 1986).

Two theories have been offered to explain the disparate vividness effects reported in the literature: differential attention (Taylor and Thompson 1982) and availability-valence (Kisielius and Sternthal 1984). Both explanations provide accounts for vividness effects by examining the role of resource allocation in message processing and persuasion. The differential-attention view suggests that when attention is constrained, vivid information is likely to attract greater attention and is thus more persuasive than pallid information. In contrast, when people are able to process vivid and nonvivid information in detail, similar levels of attention can be devoted to message processing and the vividness effect is eliminated. This explanation anticipates the finding that increasing the resource allocation enhances the impact of a nonvivid appeal in relation to the vivid message reported by Rook (1987). However, it is not apparent how differential attention explains the observation that increasing resources enhances the impact of the vivid information more than pallid information (McGill and Anand 1989) or reduces the impact of a vivid message in relation to a pallid one (Frey and Eagly 1993; Kisielius and Sternthal 1984).

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The availability-valence explanation is based on the premise that when resource allocation is low, vivid information prompts greater elaboration than nonvivid information and that increasing the resources allocated to message processing stimulates elaboration of nonvivid information but not vivid information, thereby reducing the vividness effect. This explanation can account for Rook's (1987) observation that increasing resources enhances the persuasiveness of nonvivid information when the message activates favorable associations. It also explains the finding that increasing resource allocation reduces the impact of a nonvivid message when the message activates unfavorable associations (Frey and Eagly 1993; Kisielius and Sternthal 1984). However, the availability-valence account seems less adequate to account for the increase in the persuasiveness of a vivid message in relation to a pallid one when resource allocation is enhanced (McGill and Anand 1989).

The purpose of the present research is to introduce theorizing that offers an explanation for the various effects of vividness on message persuasion reported in the literature. As a starting point, we shall make two assumptions about the nature of vividness effects on persuasion. One is that vivid information is less resource demanding than pallid information. The other is that the persuasive impact of a message is maximized when the resources allocated to the message match those required for the message-processing task.

RESOURCE MATCHING AND VIVIDNESS EFFECTS

The relationship between level of resource allocation and the vividness effect can be depicted by the resource-matching hypothesis (Anand and Sternthal 1987; Meyers-Levy and Peracchio 1995). According to this view, the persuasive impact of a message is maximized when the resources allocated to the elaboration of the communication content match those required for this task. The allocation of too few resources results in impoverished message elaboration and limited persuasion (Meyers-Levy and Peracchio 1995). The allocation of too many resources may also undermine persuasion if the resources are used to generate counterarguments or irrelevant associations to the message (Kisielius and Sternthal 1984). These observations imply that over a sufficient range, resource allocation is nonmonotonically related (i.e., forms an inverted U) to message persuasion.

Vivid Information Is Less Resource Demanding

To apply resource-matching notions to the explanation of vividness effects, we begin with the assumption that vivid information is *less* resource demanding than nonvivid information. Nisbett and Ross (1980) offer a number of reasons to believe this assumption is reasonable. Specifically, they note that vivid information is more at-

ention getting, emotionally arousing, interesting, image producing, memorable, and easier to elaborate upon than nonvivid information. If this assumption is correct, it implies that the match between resources allocated and those required for processing a vivid message should occur at a lower level of resource allocation than that required for processing a nonvivid appeal (Fig. 1).

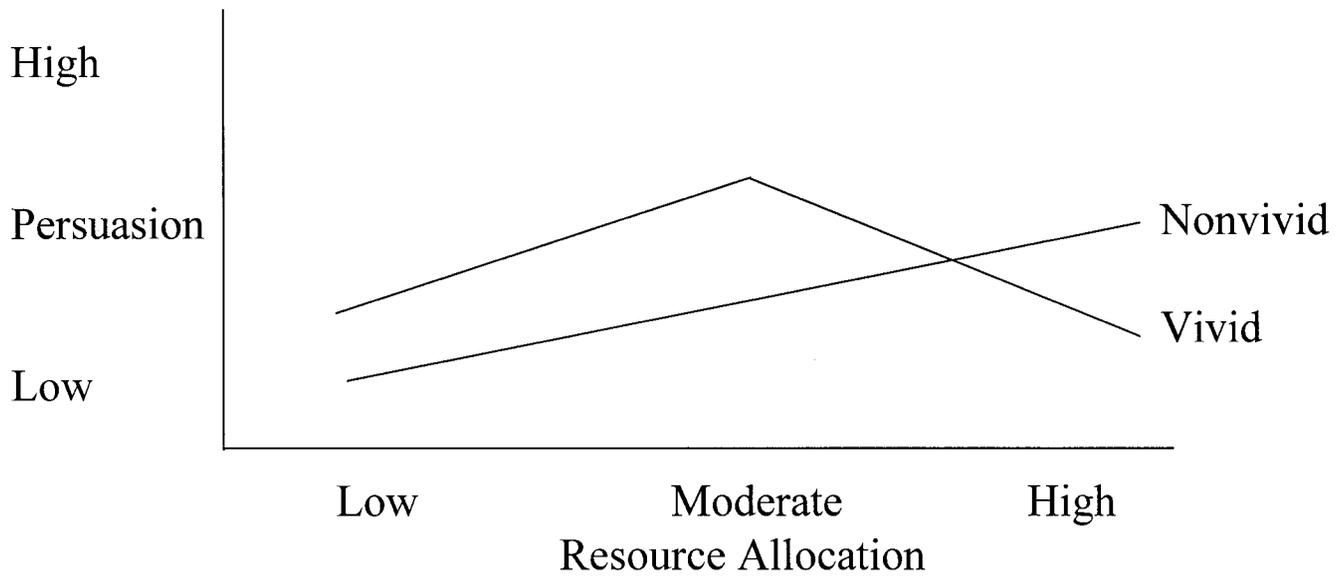
A study by McGill and Anand (1989) provides partial support for the persuasion pattern depicted in Figure 1. They investigated the effect of varying the resources allocated to processing a vivid and pallid message in the context of choosing between two cars. Message recipients' decisions were based on four features, two of which were described vividly (e.g., sporty yet elegant *styling* and classy and high-tech *interior design*) and two that were described nonvividly (e.g., below average *storage space* and below average *dealer service*). Car 1 had more positive values on the vivid features, while car 2 had more positive values on the nonvivid features. Research participants preferred car 1 only when they were given instructions to imagine owning and driving the car, whereas they were indifferent in their preferences when they were told not to imagine the cars.

These data can be interpreted from a resource-matching perspective if it is assumed that the vivid information is less resource demanding than the nonvivid information. Along these lines, instructions to image are likely to prompt the allocation of sufficient resources to elaborate on the less demanding vivid features but not the nonvivid features (moderate allocation; see Fig. 1). The benefit of the incremental elaboration afforded to vivid information was mitigated by instructions to suppress imagery (low allocation; see Fig. 1).

The above version of the resource-matching view can also account for studies indicating the greater persuasiveness of vivid information when the resources allocated to the task are decreased. Rook (1986) presented a health message that was either a vivid personal story or a nonvivid abstract story and was either of high or of low personal relevance to respondents. The results of this and a subsequent study (Rook 1987) indicate that respondents were equally persuaded by the vivid and nonvivid stories when these stories were personally relevant, whereas respondents were more persuaded by the vivid story when the stories' relevance was low. In resource-matching terms, subjects allocated sufficient resources to elaborate on both the vivid and the nonvivid stories when the message was personally relevant (high allocation; see Fig. 1). However, when respondents were less motivated, they allocated fewer resources, which were sufficient to elaborate on the vivid, but not the nonvivid, story (moderate allocation; see Fig. 1).

Finally, the resource-matching view can be used to interpret why vivid information is always found to be more persuasive than nonvivid information in studies that attempt to vary resource allocation (Shedler and Manis 1986; Taylor and Wood 1983). It may be that in these studies attention was calibrated so that sufficient resources

FIGURE 1
THE EFFECT OF RESOURCE ALLOCATION ON THE PERSUASIVENESS OF VIVID AND NONVIVID INFORMATION



Vivid Information:	Allocation < Required	Allocation = Required	Allocation > Required
Nonvivid Information:	Allocation < Required	Allocation < Required	Allocation = Required

were available to elaborate on the vivid, but not the non-vivid, information. Such outcomes might occur because attempts to produce high levels of resource allocation by expecting subjects to attend to the task fully, or by not distracting them, results in only moderate levels of resource allocation and elaboration. This outcome is particularly likely in the present studies because the instructions to enhance resource allocation were embedded within the stimulus, a technique that Wright and Rip (1980) have found to weaken the intervention in other investigations.

The results of the studies reviewed up to this point are congenial with the resource-matching view that if vivid information is less resource demanding than nonvivid information, increasing the resources allocated to a vivid message will produce a nonmonotonic (i.e., an inverted U) persuasion response, whereas increasing the resources allocated to a nonvivid message enhances persuasion monotonically. In addition, as depicted in Figure 1, if these outcomes are obtained, a vividness effect is likely at a moderate level of resource allocation but not at a low or high level.

At the same time, it is important not to claim too much for the resource-matching hypothesis. Support for this view derives from piecing together outcomes reported in various studies. There is no direct evidence that increasing resource allocation is nonmonotonically related to persuasion for vivid information, or that this same variation of resource allocation is linearly related to persuasion for

nonvivid information. These effects are tested in the first three experiments we report.

Support for the pattern of outcomes depicted in Figure 1 would be congenial with the resource-matching hypothesis if it were assumed that the processing of vivid information is less resource demanding than the processing of pallid information. However, it should be noted that there is nothing inherent in vivid information that necessarily makes it less resource demanding. Indeed, we suggest that in some studies, the specific operationalizations of vividness used are likely to impose greater resource demands than those required in the pallid conditions. We introduce this assumption to account for the results reported by Frey and Eagly (1993) as well as those by Kisielius and Sternthal (1984).

Vivid Information Is More Resource Demanding

Frey and Eagly (1993) found that a nonvivid (abstract) version of an editorial was more persuasive than a vivid (concrete) version when message recipients were not instructed to attend to the editorial, whereas there was no vividness effect on judgments when they were given explicit instructions to pay attention to the editorial. Frey and Eagly also report higher persuasion for the abstract editorial when the experimental task was incidental than when subjects were instructed to attend to the task. A

similar pattern of effects was also obtained in an experiment by Kisielius and Sternthal (1984, experiment 1).

From a resource-matching perspective, this pattern of data is explained most cogently by assuming that the vivid information was *more* resource demanding than the nonvivid information. This assumption is congenial with both Frey and Eagly's and Kisielius and Sternthal's interpretation of their data. In effect, the assumption that vivid information is more resource demanding implies that the vivid and nonvivid labels shown in Figure 1 should be reversed.

We examine these effects in experiment 4 by calibrating the stimuli so that vivid information is more resource demanding. Support for the view that in some circumstances vivid information might be more resource demanding than a more pallid message and in others less so would underscore the importance of determining the resource demands imposed by messages differing in vividness to predict their persuasive impact accurately.

VIVIDNESS DATA SETS (EXPERIMENTS 1–3)

The procedures used in the first three studies, experiments 1–3, are described together because they all deal with health-related issues and they share common procedures. The studies involve the presentation of vivid or nonvivid messages designed to dissuade people from engaging in harmful health-related behavior. In addition, communication recipients' perception of their vulnerability to the illness described is used as an indicator of the level of resources they allocated to the message-processing task (Rook 1987). The persuasiveness of these appeals is assessed by message recipients' intention to comply with the behavior recommended in the appeal. Support for the resource-matching framework would be obtained if increasing resource allocation leads to a non-monotonic response for the vivid message and a linearly increasing trend for the nonvivid information with regard to persuasion (Fig. 1).

Below we describe the experimental context, the manipulation of vividness, and the measurement of manipulation checks as well as the persuasion measure for experiments 1–3. This is followed by a discussion of how we measured and analyzed perceived vulnerability, which served as the indicator of resource allocation.

Experiment 1: Skin Cancer Task

One hundred and twenty graduate and undergraduate business students rated the persuasiveness of a brochure on how to detect and prevent skin cancer. The message recommended regular self-examinations for lesions on the skin. Vividness was manipulated by whether or not text material describing the physical warning signs of skin cancer was accompanied by pictorial information (Kisielius and Sternthal 1984). The vivid pamphlet presented five warning signs, an open sore, a reddish patch, a

smooth growth, and a shiny bump and a scarlike area, with accompanying colored photographs and descriptions. The nonvivid version consisted of the same five descriptions of the warning signs but did not include the photographs. Persuasion was measured on four items: "I am more likely to do a self-examination now than I was before reading this brochure," "I think performing self-examination is important," "Self-examinations are important in the diagnosis of skin cancer," and "I am more interested in learning about skin cancer and the self-exam now than I was before" ($\alpha = .80$). A manipulation check requiring subjects to rate how easy it was to picture or otherwise imagine the warning signs on a seven-point scale showed that the pictures were more vivid than the text-only information ($\bar{X} = 4.95$ vs. $\bar{X} = 4.00$, $t(118) = 3.00$, $p < .001$).

Experiment 2: Smoking Task

Ninety-four undergraduate smokers evaluated a pamphlet that recommended the use of a fictitious nicotine patch to reduce the incidence of smoking. All subjects received information about the dangerous consequences of smoking (e.g., swollen lymph nodes in the neck) followed by recommendations on how to use and remove a nicotine patch. Vividness was manipulated by instructing subjects to engage in imagery processing: "Utilize the power of your imagination to help you visualize this situation." Subjects in the nonvivid condition were asked to be "well-reasoned and logical . . . don't let your imagination get the better of you" (McGill and Anand 1989). Persuasion was measured on three items: "How likely are you to call the toll-free number listed in the message?" "Would you be interested in learning more about the patch?" and "Would you be likely to discuss the patch with a friend?" ($\alpha = .78$). A vividness manipulation check indicated that subjects who engaged in imagery found that the message was more easily pictured or imagined ($\bar{X} = 4.51$) than those subjects who were asked to be well-reasoned and logical ($\bar{X} = 3.69$, $t(92) = 1.85$, $p < .05$).

Experiment 3: Sexually Transmitted Disease Task

One hundred and ninety undergraduate students assessed the effectiveness of a brochure designed to increase awareness and prevention of sexually transmitted diseases caused by the human papilloma virus (HPV). All the brochures contained recommendations for the prevention of HPV (e.g., practice safer sex, have regular check-ups). Vividness of the information was manipulated by presenting either personal or impersonal histories of people with HPV (Rook 1985). Research participants in the vivid condition received an anecdotal story that described a fictitious couple's (Linda and Jeff) reaction upon learning that one of them has HPV (e.g., "As soon as I got back to the dorm, I called my best friend Liz. I was feeling

pretty anxious and sort of panicky”). In the nonvivid version, the stories were depersonalized by replacing summary statistical information for the personal anecdotes (e.g., “A large percentage of women told us they felt anxious and panicky and needed to confide to a close woman friend”). Persuasion was measured on two items: “I believe the pamphlet is persuasive” and “I am likely to follow the recommendations in the brochure” ($\alpha = .84$). Six items were averaged to produce a vividness scale anchored by the following: not vivid/vivid, not personal/personal, not concrete/concrete, not easy to imagine/easy to imagine, not easy to relate to/easy to relate to, and not easy to picture/easy to picture ($\alpha = .89$). A manipulation check on this vividness scale confirmed that subjects perceived the personal information ($\bar{X} = 5.35$) to be more vivid than the impersonal information ($\bar{X} = 4.43$, $t(187) = 5.85$, $p < .001$).

Analytical Procedures

In addition to varying the vividness of the message information, we assessed the resources message recipients allocated to the processing task using Rook’s (1987) measure of personal relevance. In all three studies, research participants were asked to respond to the question: “How vulnerable do you think you are to skin cancer (or to the dangerous effects of smoking or HPV)?” A seven-point semantic differential scale with endpoints labeled “not at all vulnerable” (scored 1) and “very vulnerable” (scored 7) was used for this purpose.

Although we could test the linear and quadratic trends of seven levels of resource allocation on persuasion for vivid and nonvivid stimuli, small cell sizes undermined our ability to test the difference between vivid and nonvivid information at each level of resource allocation.

We addressed this concern by dividing each sample into three categories such that the number of subjects in each category was approximately equal (see Rook 1987). For example, in the skin cancer information study, subjects were assigned to the low-resource-allocation condition if their level of vulnerability ranged from 1 to 3, to the moderate-resource-allocation condition if their scores were either 4 or 5, and to the high-resource-allocation condition if they rated their level of vulnerability as greater than 5. Table 1 presents the means and standard deviations for the persuasion measure as well as the cell sizes for the three studies categorized by three levels of resource allocation.

The linear and quadratic trends of vivid and nonvivid information depicted in Figure 1 were tested at three and seven levels of resource allocation. Simple effects between vivid and nonvivid information at each level of allocation and differences between resource allocation within vivid or nonvivid information were tested at only three levels of resource allocation.

In accord with the resource-matching notion, we assessed the resources that message recipients perceived they required for the processing task. Subjects were asked

whether the message they processed required a lot of effort or required little effort. In general, the vivid information was considered less resource demanding than nonvivid information (skin cancer: $t(118) = 2.97$, $p < .01$; smoking: $t(92) = 1.26$, $p < .21$; HPV: $t(187) = 3.49$, $p < .001$; combined $z = 4.42$, $p < .05$, one-tailed).¹

To examine the power of our tests, we combined the effects for the three studies and performed several additional analyses (Wolf 1986). First, we tested the homogeneity of effects and effect sizes to ensure that the combined effect could be interpreted without consideration of moderators. Then we examined the combined z statistics, combined effect size, and the fail-safe n , or the number of studies it would undertake to reverse the direction of the significant simple effects found in this data set.

Results

An analysis of trend was conducted for each level of vividness across both the three and the seven levels of resource allocation. As Table 2 shows, there was a significant quadratic trend for vivid allocation and a significant linear trend for nonvivid information for both the three and the seven levels of resource allocation. As shown in Figure 1, increasing the resources allocated to vivid information first resulted in an increase and then in a decrease in the favorableness of judgments, whereas the linear trend is either not significant or it is much smaller in magnitude than the quadratic trend. In contrast, judgments became more favorable as the resources allocated to the nonvivid information were increased (the exception is the skin cancer study at three levels of resource availability), and the quadratic trends for nonvivid information were nonsignificant in all studies.

These findings support the premise that vivid information is easier to elaborate upon than nonvivid information. Accordingly, the match for vivid information occurs at a lower level of resource allocation than the match for nonvivid information. The result is an inverted-U relationship between allocation and persuasion for vivid information and a positive linear allocation-persuasion relationship for nonvivid information (Fig. 1).

An ANOVA was conducted to assess the effects of three levels of resource allocation and vividness on persuasion. This analysis indicated that none of the main effects for resource allocation or vividness were significant (p 's $> .15$), with the exception of a significant main effect of resource allocation for the HPV study ($F(1, 185) = 6.01$, $p < .003$). The interaction between resource allocation and vividness was significant or approached significance in all studies (skin cancer: $F(1, 115) = 2.76$, $p < .07$; smoking: $F(1, 89) = 3.32$, $p < .05$; HPV: $F(1, 183) = 2.83$, $p < .06$).

¹Only one-tailed tests are used for combined scores since the direction of the majority of results for the individual studies used in the analysis are known (Rosenthal 1980). All other tests are two-tailed.

TABLE 1
MEANS AND STANDARD DEVIATIONS FOR PERSUASION CATEGORIZED BY STUDY AND TREATMENTS

Resource allocation	Vivid			Nonvivid		
	Low	Medium	High	Low	Medium	High
Skin cancer:						
Mean	4.84	5.48	5.01	5.08	4.99	5.49
SD	1.13	.85	.92	.85	1.13	.89
N	21	29	13	18	18	21
Smoking:						
Mean	3.00	3.89	2.71	2.53	3.40	4.58
SD	2.18	1.54	1.21	2.21	1.74	1.61
N	11	21	17	12	27	16
HPV:						
Mean	4.69	5.83	5.27	5.01	5.29	5.83
SD	1.79	.88	1.69	1.62	.98	.72
N	31	29	31	41	29	29

A test of homogeneity or diffuse test was used to examine whether our three studies were homogenous (Rosenthal 1983). If these studies exhibit significant heterogeneity, it becomes important to examine the outliers and to test for mediating effects that may explain the heterogeneity. A similar procedure is used to estimate the homogeneity of effect sizes (Rosenthal and Rubin 1982). A chi-square statistic indicated insignificant effects for all the contrasts (range for homogeneity of statistic tests, $\chi^2 = .01-1.97$, p 's $> .20$; range for homogeneity of effect sizes, $\chi^2 = .22-.80$, p 's $> .30$). Given this overall support for homogeneity between studies, we discuss only the combined z scores in Tables 3 and 4, although the simple effects for each study are also included in the same tables.

The effect of increasing resource allocation from a low to moderate level and from a moderate to high level were estimated for the vivid and nonvivid condition (Table 3). As shown in Figure 1, persuasion for vivid information increases significantly as resource allocation increases from low to moderate levels but decreases significantly when resource allocation increases from moderate to high.

The outcomes are also consistent with the predicted positive, linear allocation-persuasion relationship for nonvivid information. Although an increase in resource allocation from low to moderate did not significantly increase persuasion, further increases in resource allocation from moderate to high increases the persuasiveness of nonvivid information dramatically. With the exception of the small low to moderate allocation effect for nonvivid informa-

TABLE 2
F-VALUES FOR LINEAR AND QUADRATIC TRENDS OF RESOURCE ALLOCATION ON THE PERSUASIVENESS OF VIVID AND NONVIVID INFORMATION

	Seven levels of resource allocation			
	Vivid		Nonvivid	
	Linear trends	Quadratic trends	Linear trends	Quadratic trends
Skin cancer	$F = 6.48, p < .05$	$F = 13.13, p < .05$	$F = 3.38, p < .05$	$F = .02, NS$
Smoking	$F = 1.26, NS$	$F = 5.06, p < .05$	$F = 5.92, p < .05$	$F = 1.66, NS$
HPV	$F = .29, NS$	$F = 25.24, p < .05$	$F = 7.39, p < .05$	$F = .21, NS$
	Three levels of resource allocation			
	Vivid		Nonvivid	
	Linear trends	Quadratic trends	Linear trends	Quadratic trends
Skin cancer	$F = .25, NS$	$F = 5.07, p < .05$	$F = 1.76, NS$	$F = 1.18, NS$
Smoking	$F = .11, NS$	$F = 3.31, p < .05$	$F = 8.82, p < .05$	$F = .11, NS$
HPV	$F = 2.38, NS$	$F = 7.49, p < .05$	$F = 15.71, p < .05$	$F = 1.14, NS$

TABLE 3

THE EFFECT OF CHANGE IN RESOURCE ALLOCATION ON THE PERSUASIVENESS OF VIVID AND NONVIVID INFORMATION

	Resource allocation change					
	Low-moderate			Moderate-high		
	<i>t</i>	<i>p</i> -value	<i>d</i>	<i>t</i>	<i>p</i> -value	<i>d</i>
Vivid:						
Skin cancer	2.30	.03	.65	-1.62	.11	.53
Smoking	1.34	.19	.48	-1.74	.09	.86
HPV	3.38	.001	.85	-1.74	.09	.44
Combined <i>z</i>	3.96	.001	.69	-2.87	.002	.55
Nonvivid:						
Skin cancer	-.28	.78	.09	1.55	.13	.50
Smoking	1.32	.19	.44	2.23	.03	.70
HPV	.83	.41	.22	2.37	.02	.64
Combined <i>z</i>	1.05	.15	.24	3.47	.001	.61

tion, the effect sizes (*d*) for the vivid and nonvivid condition are in the moderate range (Cohen 1977). It would take approximately 10 studies to reverse the effect of increased persuasion for nonvivid information as resources allocated increased from moderate to high. It would take 14 studies to reverse the effects for the vivid information with increases in resource allocation from low to moderate and six studies to reverse the vivid information effects from moderate to high resource allocation.

The combined *z* results in Table 4 indicate that vivid information is more persuasive than nonvivid information in the moderate condition. As predicted, vivid and nonvivid information are equally persuasive when very few resources are allocated. Nonvivid information is marginally more persuasive than the vivid information in the high-resource-allocation condition, an outcome that we shall return to in the discussion. The combined effect size (*d*) scores are all in the medium range. It would take approximately six studies to reverse the higher persuasion found for vivid information in the moderate-resource allocation condition.

Discussion

The results of three experiments indicate that increasing the resources individuals allocate to message processing enhances the persuasive impact of a nonvivid message and first enhances and then reduces the impact of a vivid message. These outcomes are consistent with the assumption that vivid information is easier to elaborate upon than nonvivid information. Following this assumption, it appears that the match between the resources required for processing and those allocated to the task occurs at a lower level of resource allocation when the presentation is vivid than when it is pallid.

The data also indicate that vivid and nonvivid information differed in their persuasive effects only when a moderate level of resources were allocated to message processing. When resource allocation was low, it appears that there were insufficient resources to elaborate on the message in response to either the vivid or nonvivid information, and thus no difference in the persuasiveness of these appeals was found. When resource allocation was high, the resources allocated to processing the nonvivid message more closely approximated those needed for the task and persuasion was enhanced. In contrast, this allocation was greater than was needed for processing the vivid message, causing its persuasive impact to decline to the point where it was marginally less persuasive than the nonvivid appeal.

EXPERIMENT 4

In the first three studies, we calibrated the stimulus message so that vivid information was less resource demanding than the nonvivid information. However, there is nothing inherent in vivid stimuli that necessarily makes this information less resource demanding than nonvivid presentations. Experiment 4 is designed to illustrate this point by making vivid information more resource demanding than pallid information.

Research participants evaluated the persuasiveness of a pamphlet that described the dangerous consequences of drinking and driving (e.g., the increased possibility of

TABLE 4

DIFFERENCES BETWEEN THE PERSUASIVENESS OF VIVID AND NONVIVID INFORMATION IN LOW-, MODERATE-, AND HIGH-RESOURCE-ALLOCATION CONDITIONS

	Resource allocation								
	Low			Moderate			High		
	<i>t</i>	<i>p</i> -value	<i>d</i>	<i>t</i>	<i>p</i> -value	<i>d</i>	<i>t</i>	<i>p</i> -value	<i>d</i>
Skin cancer	-.75	.46	.24	1.70	.10	.49	1.51	.14	.53
Smoking	.52	.61	.21	1.03	.31	.30	-2.59	.02	1.32
HPV	-.79	.43	.19	2.34	.02	.58	-1.63	.11	.46
Combined <i>z</i>	-.57	.28	.21	2.87	.002	.46	-1.52	.07	.63

having a car accident). As in the previous experiments, the resource demands imposed by the communication were varied by the manipulation of the message vividness, and research participants' persuasion judgments were assessed under three and seven levels of self-reported resource allocation. However, unlike the prior studies, a manipulation was sought that would make the vivid appeal more resource demanding than the nonvivid message.

To achieve this goal, vividness was manipulated by varying the concreteness of the message recommendations (Reyes, Thompson, and Bower 1980). The description in the vivid condition contained three specific steps to reduce the incidence of drinking and driving:

1. Designate a driver before you start out—do it when you plan the occasion. To avoid last minute confusion, plan and map a route for dropping people off at home before you go out.
2. Hand over the keys to the designated driver. This way you won't be tempted to drive yourself, and also gives the driver an added sense of responsibility.
3. Provide moral support to your designated driver during the evening. Include him/her in the festivities and jokes; buy him/her nonalcoholic drinks; don't tempt the driver with alcohol. Designated drivers can have as much fun as the rest of the group.

By contrast, in an effort to make the nonvivid description less resource demanding, the message stated in abstract terms that the reader could reduce the incidence of drunk driving through self-discipline and control.

Learning to avoid drinking and driving is just a matter of self discipline. It's easy to control yourself not to drink and drive—Just a simple matter of self awareness and motivation. Start a new way of life—Don't drink and drive!

Our prediction was that if the vivid information was more resource demanding than the pallid information, two outcomes would occur: When the information presentation was nonvivid, persuasion would be enhanced with initial increases in the resources allocated to its processing and decline as resource allocation continued to increase. However, when the information presentation was vivid, increasing resource allocation would increase persuasion monotonically.

Procedure

Research participants were exposed to either the vivid or nonvivid version of the message, and they then responded to a number of questions. They answered the same vulnerability items as were used for the previous three studies, and their level of perceived vulnerability to the health-related dangers of drinking and driving was rated on a seven-point scale (1 = not at all vulnerable, 7 = very vulnerable). Research participants who rated themselves between 1 and 3 on the vulnerability measure were categorized as belonging to the low-resource-alloca-

tion group ($n = 23$), those who rated themselves as either 4 or 5 were considered to be the medium-resource-allocation group ($n = 23$), and those who rated themselves as 6 or 7 on the vulnerability measure ($n = 17$) composed the high-resource-allocation group.

To check the vividness manipulation, research participants rated how easy it was to picture/imagine the recommended actions on a seven-point scale (1 = "not very easily pictured or imagined," 7 = "very easily pictured or imagined"). The resources required for the vivid and nonvivid action steps in the message were assessed by asking message recipients to rate the recommended actions on five, seven-point scales (anchored by "easy task/difficult task," "easy to comprehend/difficult to comprehend," "required little effort/required a lot of effort," "easy to follow/difficult to follow," "required little attention/required a lot of attention"). The five items were averaged after a factor analysis indicated that they all loaded on one factor ($\alpha = .93$).

Persuasion was based on subjects' assessment on three items: (1) whether the information in the pamphlet was useless/useful in their decision not to drink and drive, (2) whether the information presented was not helpful/helpful to reduce the incidence of drinking and driving, and (3) whether the information was not at all persuasive/persuasive. A factor analysis indicated, these three items loaded on one factor, so all the items were averaged to create a persuasion index ($\alpha = .82$).

Results

Manipulation Checks. An ANOVA indicated that those who saw the vivid (concrete) recommendations rated them as more easily pictured ($\bar{X} = 4.64$) or imagined than those who saw the nonvivid (abstract) recommendations ($\bar{X} = 3.00$, $t(58) = 2.81$, $p < .01$). At the same time, those who saw the vivid (concrete) recommendations rated them as more resource demanding ($\bar{X} = 5.61$) than the nonvivid (abstract) recommendations ($\bar{X} = 4.56$, $t(58) = 2.00$, $p < .05$).

Persuasion Effects. Trend analyses examining the effect of vividness on three and seven levels of resource allocation indicate the presence of a marginally significant positive linear trend for vivid information (three levels: $t(30) = 1.77$, $p < .08$; seven levels: $t(30) = 1.7$, $p < .10$). Increasing resources enhances the persuasive impact of the vivid information. The quadratic persuasion trend for vivid information is not significant at three or seven levels of resource allocation ($t(29) < 1$). In contrast, the quadratic trend is significant for the less resource-demanding nonvivid information (three levels: $t(29) = 2.45$, $p < .05$; seven levels: $t(29) = 3.71$, $p < .01$), and the linear trend is not significant for both levels of resource allocation ($t(29) < 1$). Increasing the resource allocation from a low to a moderate level enhances the persuasive impact of the nonvivid information, but increasing resource allocation from medium to high results in a decline.

An ANOVA indicated that neither the main effects of resource allocation nor those of vividness are significant (p 's $> .15$). As predicted by the resource-matching hypothesis, the interaction between resource allocation and vividness is marginally significant ($F(1, 57) = 2.99, p < .06$).

Simple effects tests were conducted to assess the effects of resource allocation within each vividness condition. We found that an increase in resource allocation from low ($\bar{X} = 4.72, SD = .93, n = 11$) to moderate ($\bar{X} = 4.81, SD = 1.19, n = 12$) does not significantly increase persuasion ($t(21) < 1$), but an increase from a moderate to a high ($\bar{X} = 5.47, SD = .34, n = 9$) level has a marginally positive effect on persuasion in the vivid condition ($t(19) = 1.81, p < .08$). For the nonvivid information, increases in the resources allocated from low ($\bar{X} = 4.66, SD = 1.38, n = 12$) to moderate ($\bar{X} = 5.61, SD = .61, n = 11$) levels enhances the persuasive impact of the message ($t(21) = 2.09, p < .05$), whereas an increase in resource allocation from moderate to high ($\bar{X} = 4.82, SD = .84, n = 8$) results in a significant decline in persuasion ($t(17) = -2.39, p < .03$). Simple effect tests were also conducted to assess the vividness effects within each resource allocation level. We found that when vivid information is more resource demanding, vivid and nonvivid information are equally persuasive in the low-resource-allocation condition ($t(21) < 1$). Further, vivid information is less persuasive than nonvivid information in the moderate condition ($t(21) = -2.05, p < .05$). Finally, vivid information is marginally more persuasive than nonvivid information in the high-resource-allocation condition ($t(15) = 1.94, p < .07$), a finding that is likely to be due to the calibration. Specifically, it may be that the resources allocated in the high-resource treatment matched those required for processing the vivid message but exceeded those required for the nonvivid message by a considerable extent.

GENERAL DISCUSSION

A variety of outcomes have been reported in the literature regarding the effect of presenting vivid and nonvivid information on people's judgments of the message. In some studies, vividness enhances the favorableness of judgments; in others, the reverse occurs, or vividness does not have a significant effect. These outcomes are replicated in the present study and are explained in terms of resource theory.

Resource theory suggests that judgments are affected by the balance between the resources required to process a message and those allocated to the task. To predict vividness effects thus requires an assessment of the relative resource demands of vivid and pallid information. It also requires a determination of the resources that are likely to be allocated to the processing task. The prediction is that persuasion is maximized by a match between the resources required to process the vivid and nonvivid information and those allocated by the processor.

Consistent with this view, our results showed that when vivid information imposed relatively few processing demands (experiments 1-3), increasing the resources allocated to message processing initially enhanced the persuasive impact of the vivid information and then reduced it. Also as expected, this same increase in resource allocation resulted in a linear increase in the persuasiveness of the more resource-demanding nonvivid message. Moreover, the introduction of vivid information that was more resource demanding than the nonvivid information in experiment 4 reversed the pattern of these outcomes: resource allocation was linearly and positively related to persuasion for the vivid information and nonmonotonically related to persuasion for the nonvivid information.

The resource-matching hypothesis can also be used to anticipate the effects of vividness within resource allocation conditions. Here the prediction is that vividness effects are most likely to be obtained when the resources allocated to message processing match either the vivid or the nonvivid stimulus, but not both. Vividness effects are not expected if too few resources are allocated for processing either message. More problematic is the effect at relatively high levels of resource allocation. Although our data indicate an absence of a vividness effect, as Figure 1 suggests, this outcome reflects the calibration of resource allocation. Indeed, there is some level of excess resources at which vivid information will induce greater persuasion and a level at which nonvivid information is more persuasive.

The demonstration that vivid and nonvivid information can produce the same outcomes at different levels of resource allocation implies that there are no special characteristics that distinguish the persuasiveness of vivid information from nonvivid information, other than resource requirements. This conclusion seems inconsistent with Collins et al.'s (1988) premise that vivid material is more persuasive because it is more interesting. The main effect of vividness predicted by this premise is inconsistent with studies demonstrating an interaction effect between vividness and resource allocation or an unfavorable vividness effect. Furthermore, one cannot attribute the Collins et al. main effect to a specific operationalization of vividness (concrete/abstract); both our drinking and driving experiment and the Frey and Eagly (1993) experiments used concrete/abstract manipulations of vividness and found that when vivid information had a disproportionate influence it undermined rather than enhanced persuasion. And, this negative vividness effect was obtained in Frey and Eagly's two experiments despite the finding that subjects rated an editorial on airline terrorism (Frey and Eagly 1993, experiment 1) as more interesting than an editorial on school privatization (Frey and Eagly 1993, experiment 2).

Finally, our support for the resource-matching hypothesis contributes to the growing number of persuasion phenomena that are accounted for by this view in conjunction with notions of elaboration. It has now been demonstrated that repetition effects on judgments (Anand and Sternthal

1990); the effects of using color, color highlighting, and black-and-white in print messages on message evaluation (Meyers-Levy and Peracchio 1995); and the persuasive effects of vividness can be explained in resource-matching terms. These observations highlight the need to investigate the factors that are likely to affect the processing demands imposed by different types of persuasive devices.

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