Managing the Power of Curiosity for Effective Web Advertising Strategies

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This research investigates the effect of curiosity on the effectiveness of Internet advertising. In particular, we identify processes that underlie curiosity resolution and study its impact on consumer motivation and learning. The dataset from our simulated Internet experiment includes process tracking variables (i.e., clickstream data from ad-embedded links), traditional attitude and behavioral intention measures, and open-ended protocols. We find that a curiosity-generating advertising strategy increases interest and learning relative to a strategy that provides detailed product information. Furthermore, though curiosity does not dramatically increase the observed quantity of search in our study, it seems to improve the quality of search substantially (i.e., time spent and attention devoted to specific information), resulting in better and more focused memory and comprehension of new product information. To enhance the effectiveness of Internet advertising of new products, we recommend a curiosity advertising strategy based on four elements: (1) curiosity generation by highlighting a gap in extant knowledge, (2) the presence of a hint to guide elaboration for curiosity resolution, (3) sufficient time to try and resolve curiosity as well as the assurance of curiosity-resolving information, and (4) the use of measures of consumer elaboration and learning to gauge advertising effectiveness.

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A primary challenge in creating effective advertising is to ensure that the advertisement not only attracts the target consumer's attention, but also generates interest and educates the consumer about product benefits and positioning (cf. Aaker, Batra, and Myers 1992). Various suggestions have been made previously to achieve these objectives (e.g., teaser headlines, Fazio, Herr, and Powell 1992; repetition of message, Maynard 1995; provision of detailed information, Olson 1983). However, most of these suggestions are tactical in nature and applicable to an individual advertisement but do not speak to the strategic development of an entire campaign.

The challenges of generating interest and educating consumers become especially relevant in the domain of Internet advertising. Unlike a television commercial or print advertisement, most Internet advertising is in a form (e.g., banners, buttons) that requires sufficient interest and motivation on the part of the consumers to interact with the advertisement and access appropriate information rather than be passive recipients of the message (Hanson 2000; Kirsner 1997; Ries and Ries 2000). Consequently, Web advertisers are concerned that they have limited, if any, control over the exposure of the content of the advertising and, hence, the education of consumers (Briggs and Hollis 1997; Maddox 2001). Whereas some advertisers and managers believe that Internet ads have a role in creating brand awareness and image (Frankel 2000), many others have questioned the effectiveness of Internet advertising and argued that advertising off the Internet will always be bigger than advertising on the Internet (Ries and Ries 2000; see McKillen 2001 for a discussion). These fears are consistent with very low "click-through" rates that are registered for most Internet advertising (Hanson 2000).

The Internet as a communication medium is uniquely different from other media on several dimensions, such as interactivity, control, dynamic content, and depth of content accessible to the consumer (Hoffman and Novak 1996). Researchers have recently proposed that consumer behavior in this medium is greatly shaped by consumers' holistic experiences with this new

medium. These researchers have proposed different constructs, such as the state of flow (Csikszentmihalyi 1990; Hoffman and Novak 1996) and cognitive absorption (Agarwal and Karahanna 2000), to capture the unique dimensions of holistic experiences in technology-based interactions. A common thread underlying these different constructs is the suggestion that consumer experiences in a medium such as the Internet may often be characterized by a state of deep attention, engagement, and fun, such that "nothing else seems to matter" (Csikszentmihalyi 1990, p. 4). This perspective points to both the challenge and the opportunity for those seeking to advertise on the Internet. It explains why advertisers find it difficult to divert the attention of persons who are deeply engrossed in other activities, either experiential (e.g., net surfing) or goal-directed (e.g., on-line shopping; Hoffman and Novak 1996). It also suggests that, if appropriately designed using a suitable "creative hook," Internet advertisements would be able to leverage the same optimal experience of flow or cognitive absorption that the medium is capable of delivering to consumers.

This paper addresses concerns about the effectiveness of Internet advertising by prescribing a solution that can increase consumer motivation and experienced enjoyment of the interaction with Internet ads. Previous research has shown that consumers' motivation and ability to process new information is enhanced by generating curiosity and encouraging curiosity-based elaboration about the new information (cf. Berlyne 1960; Loewenstein 1994). Specifically, Loewenstein (1994) proposes that curiosity or "the desire to know" arises when persons become alerted to the existence of an information gap in a particular knowledge domain. In this paper, we argue that this power of curiosity can be harnessed to design an effective advertising strategy that results in greater information acquisition, enhanced learning, and better evaluation of the advertised product.

We have three specific objectives. First, we seek to demonstrate that an Internet advertising campaign in which curiosity-generating ads precede product information ads will be significantly more effective than a campaign that uses only product information ads. Second, we build a theory of curiosity generation and curiosity resolution to suggest general guidelines for executing an effective curiosity strategy. Third, we track information acquisition patterns and other process measures related to gauging Internet advertising effectiveness and study the relationship between these measures and the hypothesized product-related learning and evaluation.

The Importance of Motivating and Facilitating Consumer Learning

Internet advertising is done in a variety of forms, including banners, buttons, interstitials, hot corners, and portals (Hanson 2000). However, all forms of Internet advertising share the common characteristic that the consumer must initiate some action (e.g., click on a small graphic) to be exposed to the communication. Although banner ads on the Internet could be designed to enhance awareness and build brand image, most advertisers use them mainly as drivers of Web traffic (Hanson 2000). However, even for this objective, Internet ads are only effective when they can motivate consumers to transport themselves to the advertisers' Web sites (Briggs and Hollis 1997; Hanson 2000; O'Brien 1998). In particular, Ries and Ries (2000) claim that, due to consumer control over the information flow in cyberspace, Internet advertising can never match off-line advertising in terms of its ability to motivate and enable consumer learning, liking, and brand building. Others (Hanson 2000; O'Brien 1998) suggest that, to be successful, banner advertisements must incorporate some mechanisms that motivate consumers to interact with the medium and reach detailed product information (see also Frankel 2000). Furthermore, to encourage consumers to take immediate behavioral action with respect to the product (such as requesting a brochure or purchasing on-line), the advertisements must effectively educate consumers about both the target product and the purchasing process. Motivating consumers to search for information and facilitating learning seem to be basic requirements of an Internet-based advertising strategy.

In addition to presenting these challenges, however, the Internet also provides opportunities to develop and execute interactive marketing strategies (Deighton 1996). Interactivity allows consumers to attend selectively to the information of their choice and has been shown to facilitate learning of new information (Ariely 2000). This suggests that the Internet could be used as an effective medium for disseminating new product information. However, sufficient consumer interest and motivation to search for information are essential for the benefits of interactivity to accrue (Alba et al. 1997; Ariely 2000). Recent work in the information technology domain suggests that it may be possible to utilize the characteristics of the Internet to motivate and engage consumers actively in their interactions on the Internet. Building on prior work in psychology, many researchers have suggested that, in certain antecedent condi-

tions, consumers may feel a heightened degree of intrinsic motivation, intense concentration, and enjoyment while engaging in technology interactions (such as behavior on the Internet). This experience (conceptualized variously as a state of flow, cognitive absorption, and so on) could lead to many positive outcomes, such as positive attitudes, increased learning, and more participation (Agarwal and Karahanna 2000; Ghani and Deshpande 1994; Hoffman and Novak 1996). However, for consumers to experience such a state of flow or cognitive absorption, they must first experience a heightened sense of curiosity, intrinsic interest, challenge, perceived control, and a narrowed focus of attention (Ghani and Deshpande 1994; Hoffman and Novak 1996). We suggest that an ad strategy based on the psychology of curiosity could actively engage the consumer in processing the ad information, searching for more information, and, ultimately, learning more about the advertised product.

In this paper, we focus on Internet advertising for new products and innovations (sometimes referred to as "really new products," Lehmann 1994). To appreciate new products, consumers typically have to learn new benefits, new attributes, and new levels of existing attributes or new technologies (Lehmann 1994; Urban, Weinberg, and Hauser 1996). Therefore, an important goal during product launch is to facilitate consumer learning of key benefits and attributes. A second objective is to influence the categorization of the new product concurrently (Fusco 1994). This entails learning how the attribute–benefit relationships that characterize the new product are different from those of existing products. For successful positioning, consumers must perceive the new brand as the pioneer of a new and distinct product category so that it can gain the advantages associated with being the first entrant (cf. Carpenter and Nakamoto 1989). For example, the marketer of a new brand of digital camera would like consumers to categorize it as a new product type (i.e., digital camera) with distinctive benefits and attributes rather than as a modified version of an existing category (e.g., a filmless 35mm camera).

The Psychology of Curiosity and Implications for Advertising

Philosophers and psychologists have written extensively about curiosity and the role that it plays in human behavior across various domains (e.g., child development, education, scientific discovery, behavioral disorders; see Loewenstein 1994 for an extensive review). However, the literature on the subject has focused primarily on the sources and effects of curiosity and the measurement of curiosity traits. Little empirical work has studied the situational determinants of curiosity and the cognitive processes underlying curiosity resolution.

One recent theoretical treatment of curiosity is the "knowledge gap" perspective (also referred to as the "information gap," Loewenstein 1994). A knowledge gap can be defined as the difference between two quantities: what a person knows and what he or she would like to know. Curiosity arises when people become aware of the existence of a knowledge gap in a particular domain or when they encounter novel or inconsistent stimuli (Berlyne 1954, 1960), stimulus ambiguity or incongruity (Hebb 1949), or stimuli that violate their expectations (Hunt 1963). These situations highlight their knowledge deficiencies (Loewenstein 1994). Awareness of a knowledge gap produces an aversive feeling of deprivation or discomfort that can be alleviated only by obtaining the information needed to close the gap, which consequently produces an intense desire to modify the existing knowledge structure (Berlyne 1960).

Does the presence of a knowledge gap always result in elaboration and information search? Consider advertising for digital cameras from 1997, when they were first introduced. As one example of a knowledge gap, a "teaser" advertisement (Enrico 1995) for a product called QV might promise consumers that the QV "changes the ways in which you capture, create, and communicate pictures." Although this advertisement would be likely to attract attention, it might not translate into curiosity and active elaboration because the reader has no clues to interpret the presented information. In particular, though the consumer may realize that the advertised product is new, he or she may have neither the motivation nor the ability to elaborate further about the product. We refer to such advertising, which presents a high knowledge gap, as "no-cue curiosity." Now consider a second advertisement that also hints that the new product is a camera and uses digital technology. A reader of this second type of advertisement (which presents a moderate knowledge gap and will be referred to as "cued curiosity" hereafter) can use this additional information (cue) to generate focused and meaningful hypotheses about the QV by linking the new information with existing knowledge about both cameras and digital technology. In addition, by increasing interest in gathering information that can verify these self-generated hypotheses, the cue also facilitates search, processing, and integration of information.

Thus, curiosity—manifested as the desire to seek knowledge—is generated only when the gap in knowl-

edge is perceived as manageable or moderate (Loewenstein 1994) and consumers have some "cue" that helps link the missing information with preexisting knowledge in that domain. Several theoretical perspectives in psychology are consistent with such an inverted-U relationship between curiosity and the size of the knowledge gap (Berlyne 1960; Hebb 1949; Hunt 1963). We therefore hypothesize that

H1: The extent of curiosity will be stronger when the knowledge gap is moderate than when the knowledge gap is either very low or very high. A moderate knowledge gap can be created by advertising that provides a cue to help consumers elaborate about the missing information.

Curiosity prompts people to elaborate and generate hypotheses about the knowledge gap and thus motivates them to seek information to confirm or disconfirm these hypotheses (Klayman and Ha 1987), which result in a greater longing for knowledge (Loewenstein 1994). In addition, when curiosity-resolving information becomes available, the person implicitly reviews it to examine its degree of fit with self-generated hypotheses. This type of review, or "reprocessing," of a message will result in better recall and comprehension of the new information (Fazio, Herr, and Powell 1992; O'Brien and Myers 1985).

Prior research shows that people expose themselves voluntarily to curiosity-arousing stimuli such as crossword puzzles and mystery novels (Loewenstein 1994) because of the anticipated pleasure from satisfying the curiosity. In situations in which curiosity resolution results in the revelation of extant knowledge, Loewenstein (1994) suggests that the person generally feels disappointed with the actual information. For example, for mystery ads, Fazio, Herr, and Powell (1992) suggest that consumers may feel a sense of anticlimax (a "big deal!" response, Fazio, Herr, and Powell 1992, p. 10) when curiosity is resolved for familiar brands. We propose that this anticlimax might occur when the curiosity-resolving information is itself not very new, but for novel and truly innovative brands, an "A-ha" response and positive affect is more likely to result. In an advertising context, this suggests that the affective reactions from curiosity resolution may carry over to the new product in terms of general brand affect (see Mitchell and Olson 1981). More formally, we hypothesize that

H2: Generating more curiosity about a product will result in (a) greater elaboration, (b) greater information search, (c) better learning of the information, and (d) enhanced brand affect.

Early treatments of curiosity (e.g., Berlyne 1960) are consistent with H2b, in that they show greater information acquisition by curious persons. However, they do not study the direction of this information acquisition. The knowledge gap perspective suggests that a salient aspect of curiosity-based processing is that it provides persons with a goal to discover the information needed to close the gap and prompts them to generate specific questions and hypotheses regarding the object of curiosity. Goals help people determine the relevance of incoming information, which results in knowledge being encoded, interpreted, and organized in memory around the underlying theme or goal (Bransford and Johnson 1972; Huffman and Houston 1993; Wyer et al. 1982). This suggests that the specific trigger used to generate curiosity (e.g., an unexpected new benefit) will act as a node for processing and organizing further product information (see Huffman and Houston 1993). In a product advertising context, for example, it may be possible to generate curiosity in an advertisement by focusing on a single new benefit or feature (the curiosity "trigger") that is inconsistent with expectations about the product. We expect that the hypotheses generated by consumers would be focused on the inconsistent benefit, and consequently, the information search and elaboration would be directed toward the testing of those specific hypotheses (Klayman and Ha 1987). Thus, an advertisement could direct learning toward a particular feature or benefit by using it as the curiosity trigger. These predictions are formally captured in the following hypothesis:

H3: The generation of curiosity about a specific product feature will direct elaboration and information search toward this feature. Consequently, there will be better learning of information about this product feature.

We note that curiosity is different from other message strategies designed to elevate motivation or involvement (e.g., increasing personal relevance), because it directs attention to specific information rather than causes a generalized tendency toward more effortful processing. We next describe two experiments designed to test these hypotheses. The first experiment enabled us to test H1, that the extent of curiosity would be highest for a moderate knowledge gap. We designed two sets of ads, each with a three-level knowledge gap manipulation, and each set used a different product feature as the curiosity trigger. In the second experiment, we embedded the same ads within a simulated Internet environment and studied the effects of the knowledge gap and curiosity

trigger manipulations on information search, elaboration, and learning (H2 and H3). The second study enabled us to provide a real-world context in which subjects could choose to ignore the ad or, alternatively, link to more information about the advertised product.

In both experiments, we used digital cameras as the new product featured in the test advertisements. These studies were conducted in 1997 when the product was new to the market and consumers were relatively unfamiliar with its features and benefits. For our research, we designed advertisements for a fictitious brand of digital camera called the "Sony QV." This product allowed consumers to take filmless photographs that were stored digitally and could be handled like any computer files. Therefore, the consumer could edit photographs for content, enrich the quality of images, and change backgrounds or other art of their choice. They could also transmit photographs using the Internet and other digital technology, such as into remote computers or through a video camera onto a television screen. The device thus used two technologies (digital information processing and the Internet) to deliver two unique benefits: the ability to create images by manipulation (create benefit) and the ability to communicate them in clever ways (communicate benefit). Two sets of ads were created that featured each of these benefits as the main theme in the ad.

Experiment 1

Stimuli, Design, and Procedure

The study used a 3 (knowledge gap) × 2 (curiosity trigger) full-factorial, between-subjects design. The curiosity trigger was either the create benefit or the communicate benefit of the digital camera and was prominent in the headline of the ad. Within each curiosity trigger, three ads using the same headline and visual but differing in the size of the knowledge gap were developed. The low knowledge gap ad (labeled control) revealed that the Sony QV was a digital camera and provided detailed information about the product benefits in the headline and other features. The moderate knowledge gap ad (labeled cued curiosity) had no details about the product, but the tagline provided a cue that Sony QV was a camera. The high knowledge gap ad (labeled the no-cue curiosity) provided neither product details nor a cue about the product category of Sony QV. The Appendix shows one set of stimulus ads.

One hundred eight undergraduate students at a large state university were recruited as subjects and compensated for their participation with a token gift. Subjects were told to view a print version of an advertisement for a new product and respond to a short questionnaire. Subjects were randomly assigned to one of the six versions of the test advertisement.

Manipulation Checks

To check our manipulation of the knowledge gap, we asked subjects two questions, both of which were measured on nine-point scales. First, the variable ADEQ was the response to "In your opinion, how complete (or adequate) is the information that the ad provides about the product?" Second, KNOW was measured as a response to "How knowledgeable did you feel about this product after reading the ad?" Because ADEQ and KNOW were highly correlated (.83), we used their mean as a manipulation check for knowledge gap. A 3 × 2 ANOVA yielded only a significant main effect of knowledge gap ($p<.001$, other ps >.55). The control ad was perceived as providing the highest knowledge (X=6.33) followed by the cued curiosity ad (X=4.92) and the no-cue curiosity (X=3.89, ps <.05 in Student-Newman-Keuls test for multiple comparison of means). Our knowledge gap manipulation appeared to be successful.

Results and Analysis

We collected four measures that were designed to measure the amount of the generated curiosity in response to the print ad. Each of the following measures was collected on nine-point scales, with 9 indicating the highest degree of curiosity:

CURIOUS:	How curious do you feel about this product?
READ:	How interested would you be in reading more about this product?
INVOLVE:	How involved did you feel in reading the advertisement about the product?
STORE:	How interested would you be in checking out this product at a store?

These variables correlated highly (Cronbach's alpha=.80), so we used their mean as a measure of generated curiosity. A 3 × 2 ANOVA showed a significant main effect only of the knowledge gap ($p<.001$, other ps >.35). As predicted, the mean CURIOSITY score was the highest for the cued condition (X=6.50), lower for the no-cue condition (X=4.03), and lowest for the control condition (X=3.67). We note that the difference between the no-cue curiosity and the control conditions was small and barely approached significance ($p=.11$).

The results of Experiment 1 support H1 by showing that a higher degree of curiosity is generated when the knowledge gap about a new stimulus is moderate rather than when it is low or high. Furthermore, subjects perceived the digital camera as a novel product (X=7.12), and their self-rated prior knowledge about digital cameras was low (X=3.1). Therefore, we used the same stimuli in Experiment 2, which employs a simulated Internet context to study the consequences of curiosity on elaboration, information search, and (directed) learning about the new product.

Experiment 2

Stimuli, Design, and Procedure

Subjects were 131 undergraduate students at a large state university who earned course credit for participation. They were randomly assigned to one of the six experimental conditions, which represented the same 3 (knowledge gap) × 2 (curiosity trigger) manipulations used in Experiment 1. Subjects were asked to evaluate a cyber magazine on the basis of two successive sample issues. Each issue had eight pages of editorial articles interspersed with four ads (one test ad, three filler ads). The first issue included the test ad (referred to hereafter as AD1; it was one of the six ads used to manipulate curiosity), which was placed at the same location within the magazine for all subjects. The second issue carried an ad (referred to hereafter as AD2) that provided full information about the curiosity trigger in AD1, as well as links to access more information about the product features. AD2 was identical to the control advertisement for the corresponding curiosity trigger. Subjects went through the first issue of the magazine, came across AD1, subsequently saw other editorial sites and filler ads, and then rated the magazine on various aspects. Next, they went through the second issue of the magazine, in which they came across AD2, as well as other editorial sites and filler ads. Opinions on the magazine were collected first, followed by a distraction task and an on-screen questionnaire that was administered to measure the dependent variables. We note that the advertising across the three knowledge gap conditions is identical in terms of total information made available and the total number of exposures but differs in the temporal dissemination of information. In the control condition, all the information is available at the first exposure, whereas in the curiosity conditions, some of the information is withheld until the second exposure.

All the ads in the cyber magazine provided clickable buttons that linked to additional Web sites that provided more related information. Of particular relevance to our analysis, AD1 included a link to a product homepage. If this link was accessed, it led to a product homepage that was ostensibly "under construction" to provide answers to frequently asked questions (FAQs) and prompted visitors to submit questions that they wanted answered after seeing the product ad. This enabled us to get two process measures without giving any additional information to visitors. First, we can observe click-through to this link as an immediate response measure to curiosity, thereby capturing the desire to get more product information. Second, we can analyze the nature of questions submitted on this page as a measure of ad-generated elaboration.

The full information ad (AD1 in the control condition and AD2 in all conditions) included additional links to various features of the product, including the curiosity trigger feature that was highlighted in the test ad. We measure click-through on these links as an indication of the extent of information search in response to curiosity. Subjects could browse the magazine as long as they wanted while the computer tracked their click-through pattern, the time spent reading each ad-related link, and the time spent on the entire task.

An on-screen questionnaire was presented at the end of the magazine browsing task to elicit unaided and aided recall of ads and brands featured in the magazines. In addition, subjects were asked to recall thoughts that went through their minds while reading the test ads and specific questions or goals that they may have pursued while processing information in the test ads, as well as to list features and benefits they remembered from the digital camera ads. Specific ratings on product attributes and purchase interest were also collected. Two researchers who were blind to the experimental manipulations coded all open-ended responses, and their codes were tallied for interrater reliability. Coding conflicts were resolved by discussion between the coders.

Description of Variables, Analysis, and Results of Experiment 2

We obtained three kinds of data from Experiment 2. First, we obtained clickstream data (e.g., a record of screens visited and time spent) recorded by the computer. Second, we collected attitude and behavioral intention data. Third, we collected open-ended protocol data. We use a combination of these data in the analysis presented. Because we use click-through rates on test ads as a key dependent variable to mea-

Table 1
Effects of Knowledge Gap in Ad Processing and Consequences

Knowledge Gap Curiosity Condition	*Low Control (n=44)*	*Moderate Cued (n=47)*	*High No-Cue (n=40)*	*F(2,125) (p-value)*
Degree of Curiosity:				
Curiosity motivation (scale 1–9)	3.36[a]	6.09[a,b]	3.69[b]	35.19(.00)
% Visiting FAQ site (FAQ1)	9[a]	53[a,b]	33[b]	10.63(.00)
Information Search:				
Number of links visited (NUMLINKS range: 0–6)	1.92	2.45	2.05	.82(.40)
Time on AD1 & AD2 (ADTIME in seconds)	59.89[a]	122.99[a]	99.65	5.41(.00)
Extent of Elaboration:				
Number of queries on FAQ site (n=38)	N.A.	2.31[b]	.92[b]	10.92(.00)
Total number of questions	.88[a]	2.97[a,b]	1.14[b]	27.99(.00)
Total number of thoughts	1.18	1.89	1.33	3.24(.04)
Curiosity thoughts	.11[a]	1.28[a,b]	.62[b]	17.04(.00)
Memory & Learning:				
% Unaided brand recall	29[a]	80[a,b]	44[b]	14.74(.00)
% Unaided recall of category (digital camera)	11[a]	48[a,b]	5[b]	16.69(.00)
Total number of benefits/ features recalled	2.04[a]	4.16[a,b]	2.52[b]	23.50(.00)
Product Evaluation (Scale 1-9)				
Product AFFECT	4.68[a]	6.88[a,b]	4.83[b]	43.30(.00)
Product NOVELTY	5.38[a]	7.26[a,b]	5.83[b]	48.27(.00)
Product INTEREST	4.98[a]	7.22[a,b]	5.01[b]	26.15(.00)
Product KNOWLEDGE	3.89[a]	5.64[a,b]	3.97[b]	13.75(.00)

[a]Difference between control and cued curiosity is significant at p=.05 level.
[b]Difference between cued and no-cue curiosity is significant at p=.05 level.

sure search, we analyzed overall click-through rates on nontest ad links embedded in the magazine and filler ads to ensure that there were no differences in the overall propensity to click across conditions. The average number of nontest links accessed (X=3.21 out of 6) did not significantly differ across the experimental conditions ($F_{5,125}$=1.50, p>.19).

For the purpose of discussion, results are grouped by the hypotheses (H1, H2, and H3) tested in this experiment. In each category, we use variables analyzed by a 3 (knowledge gap) × 2 (curiosity trigger) ANOVA. Comparison of means across the three knowledge gap conditions was conducted using the Student-Newman-Keuls test to adjust for error terms for multiple comparisons. We also tested for the inverted-U prediction (with highest effects in the moderate knowledge gap or cued condition) using a quadratic contrast. As per H1 and H2, we expected to find a higher level of curiosity, information search, elaboration, and learning in the cued condition relative to both the no-cue and the control conditions. We did not predict any differences across the curiosity trigger conditions in terms of the overall levels of search, elaboration, and learning; any differences found in these measures are not particularly interesting from a conceptual perspective and therefore will not be discussed at length. Theoretically, the curiosity trigger manipulation is predicted to affect only the direction of search, elaboration, and learning (H3).

Degree of Curiosity. Several variables were used to measure the level of curiosity and interest generated by exposure to the first advertisement (see Table 1 for means). First, we consider retrospective self-rated curiosity motivation to find out more about the prod-

uct featured in the advertisement, which is measured as the mean of three scale items (product relevance, interest, and involvement in reading about the product). A 3 × 2 ANOVA for the self-rated curiosity motivation showed a significant main effect of the knowledge gap ($F_{2,125}$=35.19; p<.001), with the other effects not approaching significance (p> .37). Comparison of means showed that the curiosity motivation was significantly higher in the cued condition (X=6.09) relative to both the no-cue condition (X=3.68) and the control condition (X=3.38) at p<.05, but the means in the latter two conditions were not significantly different from each other. A test for the inverted-U prediction in H1 using a quadratic contrast for the three knowledge gap conditions showed a significant curvilinear effect ($F_{1,125}$ =69.25; p<.001).

A second variable, FAQ1, represents the proportion of subjects that accessed the product home page (i.e., the FAQ page) from AD1. This measures the behavioral response to curiosity by capturing the desire to get more information immediately after exposure to the curiosity manipulation in AD1. ANOVA results for FAQ1 yielded a significant main effect of knowledge gap ($F_{2, 125}$=10.63, p<.01), with other effects not being significant (p>.70). A comparison of means indicated that all three conditions were significantly different from one another (p<.05). As Table 1 indicates, FAQ1 in the cued condition (X=53%) is significantly greater than FAQ1 in the no-cue condition (X=33%) and in the control condition (X=10%). Again, the quadratic contrast for testing the curvilinear prediction is significant ($F_{1,125}$ =14.99; p<.001). This result is in line with our prediction that subjects in the cued condition, which represents a moderate knowledge gap, would exhibit the greatest degree of curiosity and desire to get more information.

Information Search. We also examined two variables that represented the degree of information search during exposure to the test ads. The variable NUMLINKS captured the breadth of search by tracking the number of different links that were accessed. NUMLINKS could range from 0 to 6. The level of interest and the extent of attention paid to the accessed information could be captured by the time spent browsing the test ads and embedded links (other than the FAQ link) across the two exposures (ADTIME). The overall ANOVA model did not approach significance for NUMLINKS ($F_{5,125}$=1.10; p>.36), though the extent of search was in the predicted direction, with higher scores in the cued curiosity condition relative to the other two conditions (see Table 1). As predicted, ADTIME showed a significant main effect of knowledge gap ($F_{2, 125}$=5.41; p<.01), with p>.30 for other effects, and a significant curvilinear effect in the quadratic contrast, as predicted ($F_{1, 125}$=6.88; p< .01). Browsing time was highest in the cued condition (X=125 seconds) but not significantly different from the no-cue condition (X=100 seconds, p>.05). Browsing time was the lowest in the control condition (X=60 seconds; p<.05 relative to the other two conditions).

In summary, there was an inverted-U–shaped relationship between the level of information provided in the first advertisement and the degree of interest generated in subsequent processing of the ad. Specifically, a moderate knowledge gap (cued condition) was the most effective in motivating search behavior. Although the average number of links accessed by subjects did not vary dramatically across the knowledge gap conditions, the total time spent on information search and self-reported curiosity motivation were significantly different. This suggests that the primary impact of curiosity might have been on the level of attention paid to the information that was accessed (i.e., quality of search), not merely the quantity of search.

Extent of Elaboration. Two sources of data were used to test for the differences in the extent of elaboration (see Table 1 for means). The first set of evidence comes from the open-ended questions that subjects entered on the product homepage (FAQ page). These data were available for only those subjects who accessed this homepage link. Because only four subjects in the control condition visited this screen, we confined our analysis to the two curiosity conditions, in which a total of 38 subjects accessed the product homepage. The number of questions submitted indicates the degree of elaboration on the test ad. ANOVA results on the number of questions indicated a significant main effect of knowledge gap ($F_{1, 34}$=10.92, p<.002). The main effect of curiosity trigger and the interaction were not significant (p>.44). Subjects in the cued condition submitted an average of 2.31 questions relating to the product, significantly higher than the average of .92 questions in the no-cue condition (p<.002).

In the on-line questionnaire, the second set of evidence, subjects were asked to list any specific goals, questions, or hypotheses they tried to confirm while they read the digital camera ads. A content analysis of these data replicated the previous findings. Subjects in the cued condition listed a significantly higher number of questions or goals (X=2.97; p<.05) than did those in the other two conditions, and this variable conformed to the curvilinear prediction (quadratic contrast $F_{1,125}$ =54.86; p<.001) . The mean number of thoughts listed by subjects were not significantly different across conditions (p>.05), though there is a significant effect for the quadratic contrast ($F_{1,125}$ =6.14;

$p < .01$; see Table 1 for means). In a further analysis, these thoughts were coded to capture specific elaboration related to curiosity generation or resolution ("curiosity thoughts"). The highest number of curiosity thoughts were in the cued condition (X=1.28), followed by the no-cue condition (X= .62) and the control condition (X=.11, all pairwise comparisons $p<.05$, and quadratic contrast $F_{1,125}=26.84$; $p<.001$). As was expected, none of these variables (measuring the degree of curiosity experienced by subjects) was affected by the curiosity trigger manipulation or the interaction ($p > .2$).

We conclude that subjects engaged in a greater degree of elaboration in the cued condition than in the control or no-cue conditions. The pattern of results is very consistent with our reasoning that providing an initial cue with the curiosity manipulation facilitates greater elaboration and leads to richer hypotheses generation about the product.

Product Memory and Learning. Several product-related measures were used to examine the consequences of a curiosity strategy on memory for product details, extent of learning, and evaluation of the product (see Table 1). Product memory was assessed using unaided recall of brand name and product category association. After a distraction task that lasted approximately six minutes, subjects were asked to recall brand names and category descriptions of products they saw advertised in the cyber magazine. In this unaided recall task, 53% of the subjects mentioned the brand name featured in the test ad for the digital camera. As was predicted, the knowledge gap manipulation had a significant impact on unaided brand recall ($F_{2,125}=14.74$; $p<.001$). There was no impact due to the curiosity trigger manipulation ($p>.15$) and no interaction effect ($p>.69$). Unaided brand recall in the cued condition (X=80%) was significantly greater than that in the no-cue condition (X=44%, $p<.001$), as well as in the control condition (X=29%, $p<.001$), and conformed to the inverted-U prediction (quadratic contrast $F_{1,125}=26.81$; $p<.001$).

Although 53% of the subjects remembered the brand name spontaneously, only 22% were able to recall the product category correctly as digital camera. An ANOVA of the unaided category recall showed a significant main effect of the knowledge gap manipulation ($F_{2,125}=16.69$; $p<.001$) and a significant quadratic contrast ($F_{1,125}=33.03$; $p<.001$). As many as 48% of the subjects in the cued condition were able to recall the category specifically as digital camera, substantially higher than the levels of 5% and 11% in the no-cue and control conditions, respectively ($p<.001$). In the control condition, approximately 39% specified the category more generally as a camera product, relative to 15% in the cued and 23% in the no-cue conditions. Paradoxically, the control subjects who saw an AD1 specifying the product as a digital camera were able to recall the product only generally as a camera at the end of the campaign. In contrast, the cued condition subjects who saw an AD1 suggesting that the product was a camera were able to recall the product category more distinctly as a digital camera. The no-cue curiosity subjects who had no initial clue about the product category in AD1 associated the test product with the general category of cameras rather than with digital cameras. We believe that this finding encapsulates the real difference in the quality of processing the ad message between the control and curiosity formats and reflects the outcome of the differences in search, elaboration, and learning shown by the subjects in the different conditions.

The extent of learning about the test product was also assessed by collecting an unaided listing of benefits and features that subjects associated with the brand. We predicted a significant impact of cued curiosity on product learning due to the overall motivation and elaboration provided by the curiosity cue. As was predicted, a significantly higher number of product benefits and features was recalled in the cued condition (X=4.16) than in either the control condition (X=2.04; $p<.01$) or the no-cue condition (X=2.52; $p<.01$), which conforms to the curvilinear prediction (quadratic contrast $F_{1,125}=44.30$; $p<.001$).

Product Evaluation. To test for the effect on product evaluation, subjects provided ratings of the test brand on several dimensions that were presented as 1–9 semantic scale items. We grouped these dimensions into four measures relating to affective reactions to the product, perceived newness of the product, purchase interest of the subject, and the subjective feeling of knowledge about the product. Product AFFECT is the mean of five items (overall opinion, liking, ease of use, value, and quality; Cronbach's alpha=.89). Product NOVELTY is the mean of four items (perceived newness, unusual, significance of benefits, and pioneer of a new category; Cronbach's alpha=.7). Product INTEREST comprises three items (interest in knowing product price, interest in checking product at a store, and interest in buying the product; Cronbach's alpha=.84). Product KNOWLEDGE is the mean of two items (extent of product knowledge and extent of confidence in beliefs about the product; correlation=.80).

For these four measures, we find a significant effect of knowledge gap ($p<.001$) with the means being higher in the cued condition relative to the other two conditions (see Table 1). The curiosity trigger manipulation had no main effect or an interaction effect with knowledge gap on these product ratings with one

exception. Product NOVELTY was significantly affected by curiosity trigger; perceived novelty was higher in the communicate condition (X=6.33) than in the create condition (X=5.98; $p<.04$). All four variables showed a significant effect for the quadratic contrast ($p<.001$), indicating that they support the inverted-U prediction for the knowledge gap effect.

Processing Goals

We predicted that the trigger used to generate curiosity (create or communicate benefit) would serve as the goal around which information processing is centered. Our test ad (AD2) was designed to track benefit-specific processing. Specifically, this ad revealed product identity and provided some basic information about the product. However, additional details that completely resolved the curiosity were available in Web pages linked to AD2, such that there was an information Web page dedicated to each benefit in the test ad (i.e., create and communicate benefits), as well as other links. Subjects could choose to access any of these pages by clicking on the appropriate button in AD2. We expected to see a main effect of the curiosity trigger manipulation on all benefit-specific information processing. For example, we expected that when the create benefit was highlighted, as in the create condition, subjects might be more likely to visit the create information page and recall more details related to the create benefit. However, our interest was in testing whether such benefit-specific processing would be more prevalent when more curiosity is generated about it, such as in the cued condition when the benefit is used as the curiosity trigger rather than in the corresponding no-cue condition, as predicted by the goal orientation of curiosity. Thus, our test of H3 involves finding an interaction effect between knowledge gap and curiosity trigger, with the relevant comparison being between the cued and no-cue conditions.

We examined two sets of data, the click-stream data relating to the access of create and communicate benefit links and the time spent on these links and the coding of open-ended responses to examine benefit-specific content (see Table 2 for means). We defined all variables as relative differences between the subject's focus on the create benefit and the communicate benefit. For example, relative number of visits refers to the difference between the number of visits to the create link and the communicate link. H3 predicted that these variables would show a higher difference between the create and communicate curiosity trigger conditions when the cued curiosity ad was used relative to the no-cue ad. As expected, the relative number of visits favored the create link more when the create benefit was used to trigger curiosity, but this was true only in the cued curiosity condition, not in the no-cue condition ($F_{3, 83}=6.84$; $p<.01$). Similarly, relative time (in seconds) spent on the create information screen (compared with the communicate screen) also showed differences in means in the predicted direction, though this was not significant ($p>.11$).

We also looked at benefit-specific content in the open-ended listing of processing goals or questions that subjects pursued while reading the ads. In this case, we found a significant interaction effect for relative number of questions ($F_{3, 83}=38.64$; $p<.001$). Specifically, the results reveal that the tendency to focus on create-related questions in the create condition and communicate-related questions in the communicate condition was far greater in the cued condition than in the no-cue condition. We also investigated whether the benefit used to trigger curiosity had a greater impact on the learning of that benefit when more curiosity was aroused (i.e., in the cued condition relative to the no-cue condition). To do this, the unaided listing of product benefits was coded to obtain the variable, relative number of recalls, or the difference between the number of benefits recalled related to the create and communicate features. Here also, we found support for the predicted interaction between the featured benefits and knowledge gap ($F_{3,83}=159.17$; $p<.001$). A comparison of the difference in means for create-related and communicate-related recalls shows that benefit-specific learning was higher in the cued condition than the no-cue condition (see Table 2).

In summary, we find substantial support for the goal directedness of the curiosity trigger when we examine the information acquisition pattern of subjects, retrospective elaboration protocols, and eventual recall of the product features. We find that subjects showed a greater tendency to focus on the featured product benefit in the advertisement when the ad aroused curiosity to a greater extent, as in the cued curiosity condition relative to the no-cue condition. This is consistent with our prediction that curiosity will influence ad processing more effectively if it is linked to a product class cue than if no initial product cues are provided.

General Discussion and Conclusions

Summary of Research

Research reported in this paper studied the effects of curiosity generation on advertising effectiveness in the context of Internet advertising. Using a dataset that included process tracking clickstream variables,

Table 2
Effects of Knowledge Gap and Curiosity Trigger

Knowledge Gap Condition	*Moderate Cued (n=47)*		*High No-Cue (n=40)*		*Interaction $F_{1,83}$ (p-value)*
Curiosity Trigger	*Create*	*Communicate*	*Create*	*Communicate*	
Variables[1]					
Direction of Information Search:					
Relative number of visits	.44 [a]	-.03	-.17 [a]	-.05	6.84(.01)
Relative time spent	7.89	3.48	4.28	9.00	2.68(.11)
Direction of Elaboration:					
Relative number of questions	1.61 [a]	-1.62 [a]	.00 [a]	-.09 [a]	38.64(.00)
Direction of Learning:					
Relative number of recalls	3.11 [a]	-2.72 [a]	.06 [a]	-.09 [a]	159.17(.00)

[1]Variables are defined as the difference between the means for create site (or feature) and communicate site (or feature).
[a]Difference between cued and no-cue conditions is significant at p=.05 level.

traditional attitude and behavioral intention ratings, and open-ended protocols, we showed that ads that present a knowledge gap about a new product influence both the amount and the direction of elaboration and hypothesis generation about the stimulus. We also showed that curiosity resulted in more extensive and goal-directed elaboration, as well as greater learning of product information about the curiosity trigger. Finally, curiosity-based processing of advertising resulted in better product evaluation and greater perceived novelty. We find support for the theoretical framework we propose and conclude that the power of curiosity can be harnessed to enhance consumer motivation and learning.

Implications for Theory and Internet Advertising Strategy

Our work builds on prior research in psychology (Loewenstein 1994) and marketing (Fazio, Herr, and Powell 1992) that showed that curiosity enhances the desire for information and learning. Although this effect has been documented in various contexts (e.g., incomplete photographs, mystery novels, teaser ads), there has been no effort to study systematically the situational determinants and cognitive processes underlying curiosity. Our research suggests that, though curiosity may not dramatically increase the quantity of search (e.g., number of data sources consulted), it might substantially improve the quality of search (time spent and attention devoted to each data source). Curious persons seem to not expend their energies in looking at many sources of data, but may rather focus on more efficient processing and comprehension of data.

Prior researchers have concluded that the primary effect of curiosity is to motivate search and exploratory behavior (Loewenstein 1994). Our results suggest that the effects of curiosity may go beyond the mere search for information. In particular, we find that appropriately cued curiosity also serves to direct the nature of elaboration and may result in more goal-oriented information search.

These two sets of findings enable us to address an important debate in Internet advertising. Specifically, a few Internet marketers pay media bills only on the basis of proven click-through, or those persons who click and get transported to the advertisers' Web site. However, marketers traditionally pay on the basis of the total number of exposures to the banner ad. The latter group might be paying for the many exposures its banners generate without click-through (Briggs and Hollis 1997; Sterne 1997). Our results show that significant increases in advertising effectiveness (e.g., in product recall and evaluation) accrued without proportionately large effects on the clickstream data. Measures of elaboration quality and direction (i.e., thought protocols) account for our results better than do the behavioral data (i.e., clickstreams). Thus, our research questions the use of clickstreams and click-through rates as the primary measures of advertising effectiveness on the Web.

Our results also suggest implications for the role of the time gap between curiosity generation and resolution. According to our findings, a moderate time gap is optimal for curiosity generation, elaboration,

and learning. Too short a time gap between curiosity generation and provision of curiosity-resolving information (e.g., as in our control ad or mystery ads in general) may not provide consumers with the opportunity to elaborate and generate hypothesis. However, if the time gap is too long (e.g., teaser billboards), consumers may not be motivated to elaborate because of the uncertainty of timely curiosity resolution. Our research thus predicts an inverted-U relationship between learning and the time gap.

How should the Internet advertiser use our results in developing an effective campaign? On the basis of the preceding results, we recommend four elements to a successful strategy. First, the campaign should develop curiosity by creating or highlighting a knowledge gap. This can be done in several ways (e.g., presenting surprising or incongrous information, violating expectations, posing questions). In the case of familiar brands, curiosity may be evoked by alluding to a new feature or using elements of the usage situation. Second, the knowledge gap should be created for the feature that represents the unique positioning of the brand and be accompanied by a cue that guides curiosity resolution. This will help focus elaboration and subsequent learning on the unique aspects of the product and thereby aid in the objective of building a unique positioning. Third, consumers should be assured of receiving information that will help them resolve curiosity, but this information should not be provided immediately. Fourth, we encourage advertisers to move beyond clickstream data and use measures of consumer elaboration and learning to test for advertising effectiveness.

Limitations and Future Research

Although we believe the present research has filled an important gap in our knowledge about the psychology of curiosity, our research had some limitations and opened several avenues of research. First, our stimuli used only one technology product. Although this was not a concern from a theoretical standpoint, the pattern of results we obtained might not hold for other types of categories. More generally, it would be useful to replicate the results in other product categories to ascertain their generalizability or determine product features that moderate our findings. Second, there were differences between the experimental environment and a real Internet environment. Most notably, our stimulus used full-screen ads, whereas most Internet advertising is smaller in size and therefore must compete more for attention. Although these differences pose no threats to the validity of our results, the sizes of the effects we obtain are likely to be tempered in a real Internet environment.

In addition, three potential moderators of the effectiveness of curiosity deserve further investigation. First, the effects of time separation between curiosity generation and resolution merit research. Second, it would be instructive to understand whether the novelty of the underlying product influences the effect. In contrast to our experimental results, Loewenstein (1994) argues that the resolution of curiosity often brings a sense of disappointment or anticlimax, but we predict that this occurs only when the curiosity-resolving information is mundane. Third, future research should explore the effects of expertise. Intuition suggests that moderately expert consumers would be the most likely to respond to curiosity strategies, with highly expert consumers already knowing too much and novice consumers not knowing enough to organize their information search and elaboration.

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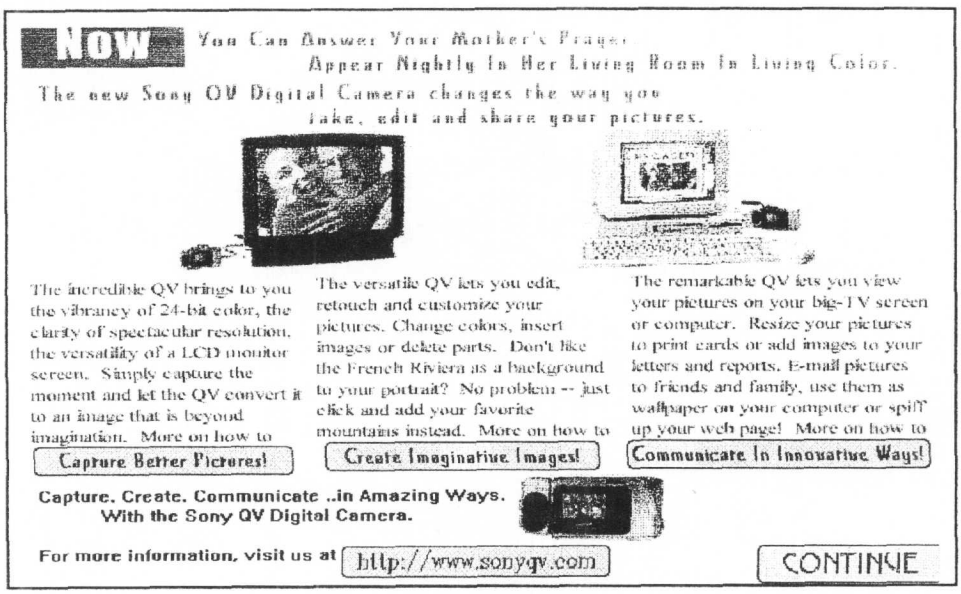
Appendix
Experimental Manipulations in First Advertising Exposure

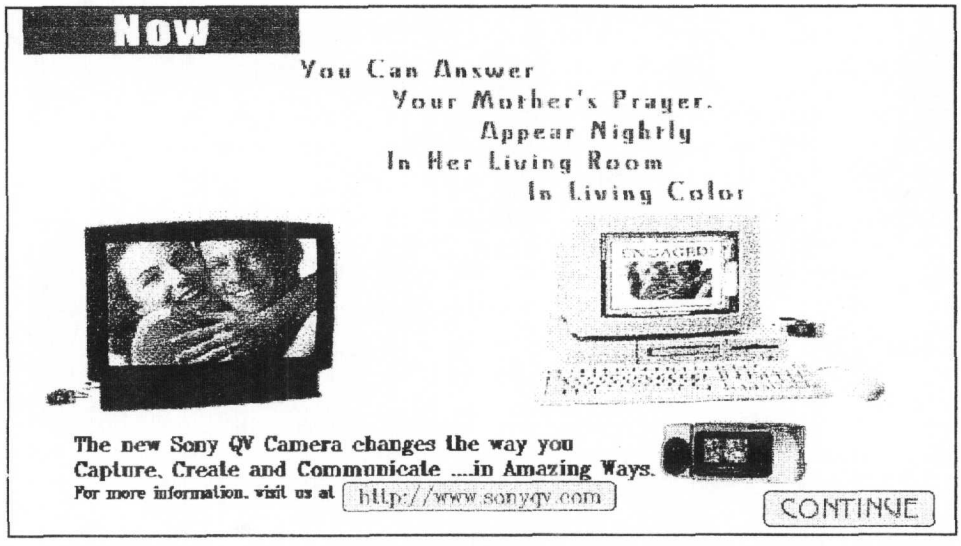
A) Control Condition-Communicate Benefit



(*continued*)

Appendix (*continued*)
Experimental Manipulations in First Advertising Exposure

B) Cued Curiosity Condition- Communicate Benefit



C) No Cued Curiosity Condition- Communicate Benefit