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Consumer Learning: Advertising and the Ambiguity of Product Experience

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This paper examines the influence of advertising on how and what consumers learn from product experience. A hypothesis-testing framework is adopted where consumers treat advertisements as tentative hypotheses that can be tested through product experience. Two experiments were conducted using product categories that provided either ambiguous or unambiguous evidence about product quality. The first experiment showed that when consumers have access to unambiguous evidence, judgments of product quality are dependent only on the objective physical evidence and unaffected by advertising. However, advertising had dramatic effects on perceptions of quality when consumers saw ambiguous evidence; judgments and product inspection behavior protocols showed that advertising induced consumers to engage in confirmatory hypothesis testing and search. The second experiment showed that advertising influenced quality judgments by affecting the encoding of the physical evidence; retrieval of ad-consistent evidence also appeared to occur, though to a lesser degree.

What do consumers learn from advertising? One possibility is that ads provide rules about consuming, much like rules learned from parents and teachers, stored in memory for use in appropriate circumstances. However, this model of learning assumes that consumers believe what ads claim, a tenuous assumption since advertisers typically are seen as partisan, low-credibility sources. A recent national survey found that 60 percent of consumers agreed that "advertising insults my intelligence" and that over 70 percent agreed that they "don't believe a company's ad when it claims test results show its product to be better than competitive products" (Needham, Harper, and Steers 1985). At the same time, however, 70 percent of consumers agreed that "information from advertising helps me make better buying decisions." What are consumers telling us when they say that advertising is helpful but not necessarily believable?

To accommodate these paradoxical beliefs, we adopt a different model to explain the role of advertising in consumer learning. We assume that consumers treat advertisements as tentative conjectures or hypotheses about product performance; product search and experience provide consumers the opportunity to evaluate the credibility of these ad-induced hypotheses. Consumers readily acknowledge that advertising can provide them with information; however, they want some

"proof" before accepting a claim advanced by a particular advertiser. Deighton's (1984) two-step model of advertising effectiveness offers a similar view. He postulated that advertising works by initially arousing expectations that subsequently lead to a disposition to confirm during experience with the product. He found that beliefs about products were determined by an interaction between advertising and objective evidence about product performance. In isolation (an "ad only" condition), subjects did not believe the information conveyed in the ad, probably because they knew it came from a potentially untrustworthy source. Moreover, subjects in an "evidence only" condition did not change their evaluations of the product after exposure to objective information from *Consumer Reports*. However, when the ad was coupled with the opportunity to view the objective evidence, product evaluations increased dramatically. Apparently, the ad "helped" consumers find relevant product information. This paper extends the work of Deighton by examining the conditions under which advertising can influence how and what consumers learn from product experience. We relate psychological research on learning from experience to how consumers may use information from advertising when evaluating products and making purchase decisions. Two experiments are reported that examine how advertising can influence consumer learning.

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LEARNING FROM EXPERIENCE

The colloquial belief is that people can best learn from experience, but most research suggests that learn-

ing from experience is very difficult (Brehmer 1980; Einhorn and Hogarth 1978). In this section, we show how prior expectations can guide perception and learning, distinguishing ambiguous from unambiguous learning environments.

Learning through Passive Observation

Bobrow and Norman (1975) distinguished two types of processing: (1) *concept-driven, top-down processing*—perception guided by expectations and prior knowledge, and (2) *data-driven, bottom-up processing*—perception guided by the objective (physical) characteristics of the stimulus. These two types of processing are analogous to Piaget's (1954) developmental concepts of assimilation and accommodation, respectively. Clearly, there are advantages and disadvantages to expectations-guided processing. Assimilation of incoming information to pre-existing knowledge structures can speed perceptual recognition (Friedman 1979) and improve comprehension and recall (Bransford and Johnson 1973), facilitating performance in complex, high-information environments. Problems arise because people often rely too heavily on prior beliefs and do not accommodate discrepant stimuli. Several studies have demonstrated the biases resulting from excessive reliance on expectations (Hastie 1981), ranging from thematic intrusions in memory for prose (Sulin and Dooling 1974) to maintenance of incorrect stereotypes (Weber and Crocker 1983). This is not to suggest that subjects never accommodate unexpected information; in fact, highly incongruent information often is remembered best and has the greatest impact on subsequent judgment (Hastie 1984; Srull, Lichtenstein, and Rothbart 1985). However, ambiguous information may well be assimilated (Bruner and Potter 1949). Cohen (1981) and Darley and Gross (1983) found strong assimilation effects in recall and judgment when subjects were given expectations about actors seen in videotapes designed to provide a large amount of fairly ambiguous information.

A good illustration of the influence of stimulus ambiguity on top-down and bottom-up processing comes from a New York Times/CBS News poll of reactions to the 1984 presidential and vice-presidential debates (see Table 1). Consider first the Mondale–Reagan debate. The consensus was that Mondale won or Reagan lost, and the results of the poll support that contention. The evidence provided in that first debate was fairly unambiguous as indexed by the “undecideds;” even a majority of the Reagan supporters overcame prior expectations and concluded that he lost. However, there may be some residual assimilation as indexed by the relative extremity of both the Reagan and Mondale supporters compared to the undecideds. Now consider the Ferraro–Bush debate. The consensus was that this debate was very close, providing only ambiguous evidence about which candidate had better rhetorical skills.

TABLE 1
NEW YORK TIMES/CBS NEWS POLL

Question	Candidate preferences			Total
	Reagan/ Bush	Mondale/ Ferraro	Undecided	
Who won Sunday night's debate?				
Reagan	26%	1%	14%	17%
Mondale	50%	93%	68%	66%
No opinion	24%	6%	18%	17%
Who won Thursday night's debate?				
Bush	78%	5%	22%	47%
Ferraro	4%	73%	19%	31%
No opinion	18%	22%	59%	22%

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The best indication of this again comes from the undecideds. In this group, the people who could discriminate a winner were split 50–50; but more importantly, almost 60 percent of the undecideds admitted that they could not discern a winner because the evidence was so ambiguous. This was not the case for people who came into the debate with a clear preference (i.e., expectations about candidate competence). Both Bush and Ferraro supporters overwhelmingly believed that their candidate had won despite vague evidence; moreover, only 20 percent of the people with prior expectations (pro Bush or pro Ferraro) found so little information in the broadcast that they refused to express an opinion about the debate winner.

Although strategic misreporting is a possibility, it seems plausible that people with prior candidate preferences selectively viewed the debate, attending more to evidence that was congruent with expectations. In an ambiguous environment, there will be information both congruent and incongruent with expectations (Lord, Ross, and Lepper 1979), but information processing limitations will prevent full attention to all the data. Theory-driven assimilation is likely to dominate because none of the data is incongruent enough to provide a clear violation of expectations. Conversely, an unambiguous environment can support data-driven accommodation because the raw data clearly can contradict expectations. In sum, research on perception and learning through passive observation indicates that people pay more attention to information consistent with prior hypotheses and also are more likely to interpret ambiguous evidence as hypothesis-confirming.

Learning Through Active Hypothesis Testing

When consumers have to learn through passive observation, one could argue that they are at a distinct

disadvantage because self-directed search for additional potentially informative data is precluded. In contrast, active hypothesis testing affords the opportunity for both choosing and interpreting the evidence. Learning may be facilitated if consumers are capable of generating evidence more diagnostic (less ambiguous) than that provided in the natural environment; alternatively, biases introduced by top-down processing may be exacerbated if consumers suffer from an additional bias to search for confirming information (Snyder and Swann 1978; Wason and Johnson-Laird 1972).

Do people have what Bruner, Goodnow, and Austin (1956) called a "thirst for confirming redundancy"? Many subsequent investigations of hypothesis-testing behavior have labeled the observed biases as "confirmation bias" (e.g., Snyder and Swann 1978). However, recent analyses suggest instead that people simply may be more concerned about false positive than false negative errors (Klayman and Ha 1985). Often this may be due to asymmetric costs associated with different types of errors, for example, personnel decisions where living with an error (a false positive "hire") may be more painful than living without an error (a false negative "no hire"). From the consumer's perspective, this reflects a greater concern for rule sufficiency than rule necessity, a pragmatic though not always logical concern dictated by a desire for identifying consumption rules that will "work" (Hoch 1984). Following Tschirgi (1980), consider the househusband who believes that the key to baking a "moist" carrot cake is to use honey. He holds this belief because every carrot cake he has baked with honey turned out moist (a sufficient rule). Therefore, he continues to use honey every time he bakes carrot cake (a confirmation bias); moreover, he is not particularly interested in experimenting with other ingredients for fear of baking a cake his family would not eat (a false positive). The fact that carrot cake also turns out moist when using brown sugar (a false negative indicating that his rule is not necessary) may never be of practical significance unless he were to run out of honey and have to substitute another sweetener.

Searching for hypothesis-consistent information (sufficiency tests) rather than inconsistent information (necessity tests) is not normatively incorrect per se; biases arise because people are not accurate in estimating the diagnosticity of the observed information when revising beliefs in their hypotheses (Fischhoff and Beyth-Marom 1983; Nisbett, Zukier, and Lemley 1981). If you observe a datum (D) that is a direct prediction of your hypothesis (H), i.e., $P(D|H) = 1$, then clearly the credibility of your hypothesis cannot decrease. However, any increase in credibility depends on how likely you are to observe the datum given the alternative hypothesis ($-H$), what Bayesians call the likelihood ratio, $P(D|H)/P(D|-H)$. Unfortunately, people display a "pseudodiagnosticity" bias (Doherty et al. 1979), a tendency to care more about $P(D|H)$ than $P(D|-H)$ when

attempting to assess the information value of a confirming instance (D). From a Bayesian perspective however, one must consider the complete likelihood ratio; otherwise a confirmation has only pseudodiagnostic value. Consumers may check to see whether a product possesses a desirable attribute as promised in an ad (a sufficiency test) without bothering to check whether the desirable attribute also is not possessed by competitive products (a necessity test). Attributes possessed by all alternatives provide no basis for discrimination and consequently have no diagnostic value. Because all ready-to-eat cereals are fortified with about the same levels of vitamins and minerals, this attribute has no comparative information value for the nutrition-conscious consumer; in contrast, sugar content is a diagnostic attribute because it varies greatly from brand to brand. People are better at using diagnostic information when it is readily available (Trope and Bassok 1983) than at assessing or searching it out (Beyth-Marom and Fischhoff 1983).

Perceived Diagnosticity and Active Hypothesis-Testing

Pseudodiagnosticity and the tendency to search for confirming information by conducting sufficiency tests is much more problematic in ambiguous than unambiguous environments. When the objective evidence is unambiguous, disconfirmation is likely to emerge (assuming that the hypothesis is false) even if consumers engage in hypothesis-consistent sufficiency tests. Disconfirmation through sufficiency tests is much less likely in ambiguous environments because of the availability of little directly contradictory information. If consumers do not bother to test the necessity of the hypothesis by assessing $P(D|-H)$, hypothesis credibility will unjustifiably increase when a confirming instance is observed. Coupled with the tendency to interpret ambiguous stimuli as hypothesis-consistent due to top-down processing (Darley and Gross 1983), effective learning will be difficult in ambiguous environments.

Why may consumers not recognize when they are operating in ambiguous, low diagnosticity environments? One possibility is that they suffer from what Langer (1975) has termed an illusion of control. She found that task cues suggesting a skill rather than chance situation (competition, choice, practice, effort) led to overconfidence about future performance; this occurred even when subjects operated in obviously uncontrollable environments (lotteries). Experts also are susceptible. Clinicians showed dramatic increases in confidence when given access to increasing numbers of informational cues even though judgment accuracy remained unchanged (Dremen 1982; Oskamp 1965); they assumed that more information was better regardless of diagnostic value. Similar results are found in attitude research: direct experience with attitude objects

FIGURE A
POSSIBLE RELATIONSHIPS BETWEEN PERCEIVED
DIAGNOSTICITY OF PRODUCT TESTING AND
ACTUAL LEVEL OF AMBIGUITY

ACTUAL LEVEL OF AMBIGUITY	PERCEIVED DIAGNOSTICITY	
	High	Low
Unambiguous	Cell 1	Cell 2
Ambiguous	Cell 3	Cell 4

not only increases attitude-behavior consistency, but also increases confidence in own attitudes (Fazio and Zanna 1981; Smith and Swinyard 1982). Other forms of active participation such as role playing have also increased confidence in own attitudes (Janis and King 1954; Zimbardo 1965). Active hypothesis testing during product evaluation possesses the necessary characteristics of a task that could induce feelings of control and increase consumer confidence, whether justified or not.

Figure A displays four product testing situations characterized by consumers' perceptions of diagnosticity and actual levels of ambiguity. Cells 1 and 4 represent cases where perceptions are congruent with reality. Consumers should have little trouble learning in Cell 1; they believe that they should be able to learn from product experience and because the evidence is unambiguous, they can. In Cell 4, consumers correctly view product testing as an uninformative activity. Product categories acknowledged as commodities would seem to fall into this cell (salt, flour, sugar); the illusion of control does not operate here. Cells 2 and 3 represent situations where consumers' expectations are not congruent with reality (see Hoch 1985 for a related discussion in terms of overconfidence in predictive judgment). Cell 2 represents a case where consumers feel they do not possess the expertise to judge product quality even though there are true differences across brands. For example, most consumers would not consider visual inspection of integrated circuits a very diagnostic experience; operationally this may turn Cell 2 into the commodity case found in Cell 4. We view Cell 3 as the most problematic learning situation. Consumers are faced with ambiguous evidence but they expect that the physical inspection of mundane, everyday products should be simple and informative. This mismatch between expectations and actual task structure will support confirmatory processing and assimilation of product evidence to prior beliefs.

Although ambiguity is an important concept in other fields (Einhorn and Hogarth 1985), the effect of product ambiguity on consumers' belief formation and change has been neglected. In Ellsberg's classic treatment of

the topic, he states: "Ambiguity is a subjective variable, but it should be possible to identify 'objectively' some situations where available information is scanty . . . or highly conflicting; or where expressed expectations of different individuals differ widely" (1961, p. 660-661). Ambiguity also is an important concept in perception, from the Gestalt school (e.g., Wertheimer 1958) to more recent work on figural reversals (Reisberg and O'Shaughnessy 1984). Ambiguous stimuli allow multiple interpretations; one interpretation can be supplanted by another with slight fluctuations in attention and subtle priming manipulations (e.g., the figure-ground illusions). In a product-testing situation, ambiguity associated with product performance can be characterized by two factors: (1) distinctiveness of the products being evaluated, and (2) potential for multiple interpretations of what would constitute high or low product performance.

Deighton's (1984) advertising and evidence experiment seems to fall into Cell 3—ambiguous evidence concerning product quality that consumers perceived as diagnostic. Consumers could inspect objective evidence (*Consumer Reports*) in any manner they desired, inducing feelings of control and increasing confidence in the information they encoded. Unfortunately, voluminous data, the close similarity of many of the alternatives, and the lack of clear disconfirming information rendered the evidence quite undiagnostic, an ambiguous decision environment.

EXPERIMENT 1

The purpose of the first experiment was to examine how the ambiguity of the decision environment would influence the relationship between advertising and product testing. Our hypothesis was that product categories providing ambiguous evidence about product quality would support top-down, assimilative processing; subjects would find evidence to corroborate either their idiosyncratic prior opinions (when no advertising was present) or the tentative expectations induced by the ad. However, product categories providing unambiguous evidence would encourage data-driven, accommodative processing; subjects would rely more on the objective evidence than on prior beliefs (in the no-ad conditions) or on ad-induced expectations.

Method

Overview. Through a pilot study (described in detail later), two product categories were selected that differed greatly in the ambiguity or diagnosticity of evidence about product quality: "polo" style mesh sportshirts (ambiguous), and paper towels (unambiguous). The basic experimental procedure was similar to those commonly employed by concept/product testing research firms (Moore 1982). A pre- and post-test design was used to measure perceptions of product quality

while controlling for heterogeneity in prior brand preferences. After the pretest, subjects were exposed to a variety of advertisements presented in the form of storyboard copy tests. Next, they were allowed to inspect six different commercially available brands in either the ambiguous or unambiguous product category. The presence or absence of advertising and product testing were factorially crossed similar to Deighton (1984): no ad/no testing control, ad/no testing, no ad/testing, and ad/testing. Finally subjects reassessed product quality.

Operationalization of Ambiguity. As mentioned previously, we view the ambiguity of a product category as a function of the distinctiveness of the different brands and the potential for multiple interpretations of overall quality. A statistic capturing both of these factors is intrasubject or test-retest reliability (Winer 1971); it is an increasing function of between-brands variability (distinctiveness) and a decreasing function of within-brands variability (multiple or inconsistent interpretations). Operationally, however, the test-retest method has serious drawbacks due to carryover effects from one testing occasion to another (Ghiselli, Campbell, and Zedeck 1981). Therefore, we decided to measure ambiguity by calculating reliability across subjects, high interjudge reliability indicating unambiguous evidence and low interjudge reliability indicating ambiguous evidence.

Six commercially available brands in each of two product categories, polo shirts and paper towels, were selected for further testing. In a pilot study, subjects indicated that judging product quality would be relatively easy for both product categories, suggesting that consumers were likely to perceive product testing as a diagnostic activity in both cases.¹ The polo shirts all looked very similar (same mesh weave, same styling features, some with logos and some without) except for color and were expected to provide ambiguous evidence (Cell 3 from Figure A). In contrast, the paper towels varied in quality quite dramatically (thickness, strength, absorbance), providing unambiguous evidence (Cell 1). A product-testing session was run using subjects from the same population as that used in the later studies. Twenty subjects rated the quality of the different products in the two categories; they were provided with the same instructions as later subjects except that all indications of actual brand identity were masked. Table 2 shows the mean ratings of the "blindfold" product testing.

Separate MANOVAs were conducted for each category. For the shirts we could only marginally reject the null hypothesis of equal quality ratings, $F(5,95) = 2.51$,

¹On a 7-point ease-of-judging product quality scale (1 = easy, 7 = hard), both paper towels ($M = 2.9$) and polo shirts ($M = 3.2$) were rated as relatively easy to judge compared to, for example, salt ($M = 5.3$) and camera lenses ($M = 5.0$). Interestingly, the ratings for shirts and paper towels were the same before and after product testing.

TABLE 2
RESULTS OF THE "BLINDFOLD" PRODUCT TESTING SESSION

Polo shirts (Ambiguous evidence)		Paper towels (Unambiguous evidence)	
Brand	Quality rating	Brand	Quality rating
J.C. Penney	5.6	Bolt	6.7
Calvin Klein	5.7	Bounty	4.8
Marshall Field	6.9	Gala	5.2
Izod	6.4	Hi-Dri	3.3
Nike	5.2	Job-Squad	8.3
Ralph Lauren	5.4	Viva	7.1

NOTE: An 11-point scale (0 = low quality, 10 = high quality) was used. $N = 20$.

$p = 0.062$. In contrast, the paper towels varied greatly, $F(5,95) = 30.2$, $p < 0.0001$. Interjudge reliabilities also were computed (Winer's r_1 statistic measuring the reliability of a single judge, p. 289). Subjects displayed good reliability in their evaluations of paper towels ($r_1 = 0.62$) and little reliability in rating the shirts ($r_1 = 0.07$).²

Procedure. Subjects were told that the research was being conducted for a downtown Chicago marketing research firm interested in evaluating various advertising copy-testing and product-testing procedures. The experiment was presented in six separate sections. First, subjects provided pretest quality ratings for four product categories (including the two target categories polo shirts and paper towels). They were shown photographs of each brand and were also provided with three or four attributes that *Consumer Reports* supposedly considered important (e.g., absorption capacity, absorption rate, and wet strength for paper towels). Subjects rated six different brands in each product category on an 11-point overall quality scale (0 = very low, 10 = very high). In Section 2, subjects were shown three different "storyboard" ads that showed a picture of a product with about 100–120 words of copy, each emphasizing a quality theme. All ad-copy points were taken from existing magazine print ads that stressed product quality and then adapted to the specific product category. Subjects were told that later they would rate each ad in

²It is important to note that low interjudge reliability is not a sufficient condition for observing low intrajudge reliability. Intrajudge reliability could be high (indicating unambiguous evidence) while interjudge reliability is low if individual subjects used different criteria to assess product quality. For example, different market segments could value/weight specific attributes differently on a consistent basis. To rule out this possibility as the basis for the low interjudge reliability observed in the shirts category, brand-to-brand variance in each subject's ratings for each product category was computed. A paired t -test indicated that the variance in ratings of the paper towels ($M = 5.5$) was greater than the variance in ratings of the polo shirts ($M = 3.6$), $t(19) = 2.63$, $p = 0.02$. This suggests that the low reliability for shirts was at least partly due to indistinguishable alternatives—that is, ambiguity.

terms of informativeness, believability, and copy flow and also would be given a recall test. Subjects saw each ad for 90 seconds. In the advertising condition, subjects saw ads for both of the target products: a J. C. Penney polo shirt and Bolt paper towels. The J. C. Penney ad employed the slogan, "J. C. Penney . . . Real Quality, Real Value," and emphasized "great craftsmanship and styling, and meticulous quality control." The slogan for the Bolt ad was, "Whatever the Mess, Bolt's the Best;" this ad also emphasized quality by asserting that Bolt was "extra absorbent, strong and longlasting." Subjects in the no-advertising condition saw three filler ads.

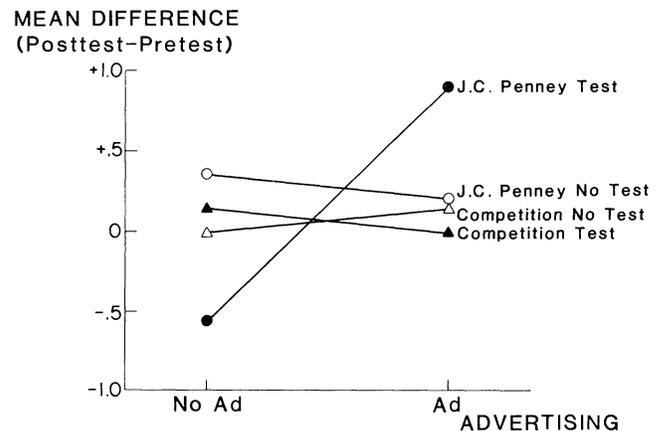
Next, subjects were escorted into an adjacent room where the six brands of either polo shirts or paper towels were arranged on a large circular table. Subjects had five minutes to inspect one of the two product categories. Those subjects examining the paper towels were provided with water and a bottle of ketchup. Subjects were given no instructions about how to test the products except for the product attributes mentioned to them during the pretest. Subjects' product testing efforts were videotaped by two unobtrusive cameras to facilitate later coding of behavior protocols. The brands were arrayed in two rows of three each. Pretesting revealed a top-left to bottom-right bias in the order of inspection; therefore, the positions of the brands were counterbalanced across subjects according to a Latin square design. After product testing, subjects returned to the other room and were asked to rate again the quality of the six brands in each of the four categories used in the pretest. Afterwards, subjects were given recall tests. Finally, subjects provided demographic information along with familiarity ratings for each of the polo shirts and paper towels.

Subjects and Design. Subjects were 64 undergraduate and graduate students at the University of Chicago. They were paid \$3.50 for participating in the 45-minute experiment. There were four independent variables: ambiguity of the evidence (unambiguous—paper towels, ambiguous—polo shirts); brands (one target brand coupled with five competitors); product testing (testing or no testing); and advertising (ad or no ad). The dependent variables were difference scores measuring change in quality ratings between the pre-test and post-test.

Results

Because of the complexity of the experimental design, the results were analyzed separately for each level of evidence ambiguity. The data from the ambiguous and unambiguous product categories were analyzed using a $6 \times 2 \times 2$ multivariate analysis of variance (MANOVA); the six different brands constituted the repeated factor, and advertising (no ad, ad) and product testing (no testing, testing) constituted between-subjects variables. In each analysis planned comparisons were made

FIGURE B
MEAN DIFFERENCE SCORES BY BRAND (TARGET VS. COMPETITION) AS A FUNCTION OF ADVERTISING AND PRODUCT TESTING FOR THE AMBIGUOUS POLO SHIRT PRODUCT CATEGORY IN EXPERIMENT 1



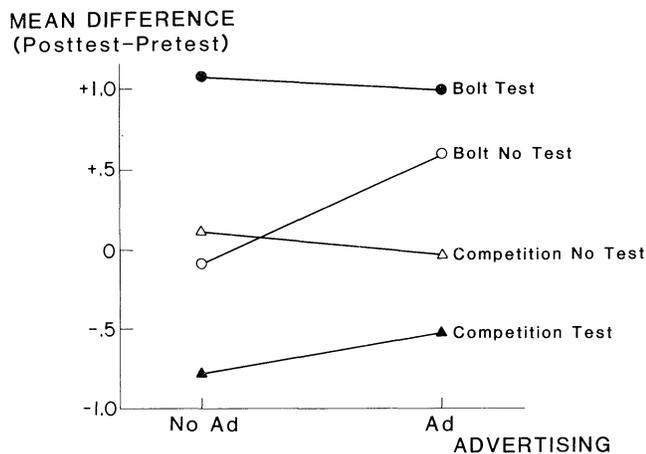
between the target brand (the advertised brand) and the competition by forming Helmert contrasts (Bock 1975)—target versus an average of the competition.³

Product Quality Ratings: Ambiguous versus Unambiguous Evidence. We hypothesized that when the product testing session could provide only ambiguous information about true product quality, we would replicate Deighton's (1984) finding of an advertising-by-evidence interaction. With ambiguous evidence, assimilative processing could occur when a subject is exposed to the ad and then has an opportunity to test the claims in the ad (i.e., the tentative hypothesis engendered by the ad). Because only one product was advertised, assimilative processing implies a three-way interaction between brand, advertising, and product testing. An overall MANOVA revealed a significant 3-way interaction, $F(5,56) = 2.57, p = 0.037$. The Helmert contrast comparing the target brand, J. C. Penney, to an average of the other five competitors clarifies the basis for this interaction. The mean difference scores (posttest—pre-test) are shown in Figure B. This 3-way interaction was also significant, $F(1,60) = 6.24, p = 0.015$. As hypothesized, subjects did not believe the assertions of the manufacturer except when they had the opportunity to test the products for themselves (ad/no testing vs. ad/testing, Newman-Keuls $p < 0.05$). Interestingly, the evidence by itself actually led to reduced product quality ratings (no ad/no testing control vs. no ad/testing, Newman-Keuls $p < 0.05$), making a Bayesian interpretation of the data untenable. J. C. Penney

³Two other sets of analyses were also conducted, one using multivariate analysis of covariance with post-test ratings as the dependent variables and pretest ratings as the covariates, and the other including familiarity ratings as additional covariates. In all cases the statistical conclusions remained unchanged.

FIGURE C

MEAN DIFFERENCE SCORES BY BRAND (TARGET VS. COMPETITION) AS A FUNCTION OF ADVERTISING AND PRODUCT TESTING FOR THE UNAMBIGUOUS PAPER TOWEL PRODUCT CATEGORY IN EXPERIMENT 1



may have suffered in the testing-only condition because some subjects may have come into the experiment with prior hypotheses about more heavily promoted brands (e.g., the market leaders, Ralph Lauren or Izod).

When product testing could provide unambiguous evidence about true product quality, we did not expect to see assimilative processing after subjects were exposed to advertising. Instead, we felt that subjects would engage in more data-driven processing, accommodating the unambiguous evidence. An overall MANOVA revealed significant differences between product ratings of the six brands, $F(5,56) = 10.02, p < 0.001$. In contrast to the ambiguous product category, the brand \times advertising \times product testing interaction was not significant for the unambiguous paper towel category, $F(5,56) = 0.70, p = 0.65$. More importantly, however, there was a large brand-by-product testing interaction, $F(5,56) = 11.29, p < 0.0001$. Figure C shows the mean difference scores from the planned comparison of the target brand Bolt with the five other competitors. As with the overall MANOVA, subjects had no difficulty detecting differences in product quality between the target product and its competitors both with and without exposure to advertising, $F(1,60) = 20.14, p < 0.0001$. Advertising had no facilitating effect on quality ratings when subjects had an opportunity to test the manufacturer's asserted claims. Product testing provided clear positive evidence for Bolt and negative evidence, on average, for the other brands.

Product-Testing Behavior Protocols. Deighton (1984) concluded that the interaction between advertising and product testing was due to the ad-induced arousal of a brand-specific hypothesis coupled with confirmatory biases in inference and information use. In contrast, we have argued (Hoch 1984; Klayman and

TABLE 3

MEAN PROPORTION OF INSPECTION TIME ALLOCATED TO EACH BRAND

Product category/Brand	Mean proportion times		
	No-ad group	Ad group	Difference
Polo shirts			
J.C. Penney*	.150	.229	.079
Calvin Klein	.166	.149	-.017
Marshall Field	.163	.158	-.005
Izod	.166	.153	-.013
Nike	.178	.150	-.028
Ralph Lauren	.177	.160	-.017
Paper towels			
Bolt*	.177	.205	.028
Bounty	.163	.163	.0
Gala	.151	.153	.002
Hi-Dri	.155	.126	-.029
Job-Squad	.184	.173	-.011
Viva	.169	.180	.011

NOTE: * = Advertised brands.

Ha 1984) that consumers typically will be more concerned with testing sufficiency (e.g., Product A is high quality) rather than necessity (e.g., only Product A is high quality). From either perspective, however, the prediction is that the presence of an ad will result in a reallocation of attention to the focal brand. Using the videotaped product-testing sessions, we investigated whether there were direct behavioral differences in product inspection between the ad and no-ad conditions. There were 32 protocols for paper towels; only 26 protocols were available for the polo shirts because of an equipment failure. The unstructured strategies used by most of our subjects precluded the development of an extensive coding scheme; thus only two behaviors were coded for each brand: total inspection time per brand and the number of binary comparisons involving each particular brand. No systematic differences were found for the number of comparisons variable. Table 3 shows the mean proportion of inspection time allocated to each brand in the two product categories.

For the polo shirts, a MANOVA of the inspection times contrasting the J. C. Penney brand to the five others revealed a significant brand-by-advertising interaction, $F(1,24) = 7.63, p = 0.01$. Subjects spent the least amount of time testing the J. C. Penney shirt in the no-ad condition (which may partially explain the observed decline in product ratings found in the no ad/testing condition); however, they allocated a disproportionately large amount of time to the brand after seeing the ad. To examine whether inspection time mediated perceptions of quality, quality ratings of subjects in the no ad/testing and ad/testing conditions were reanalyzed including inspection time as a covariate. Without the inspection times, there was a highly significant brand-by-advertising interaction when con-

trasting J. C. Penney with an average of the other brands, $F(1,24) = 5.66, p = 0.024$. However, the inclusion of inspection times as a covariate reduced the significance of this effect, $F(1,23) = 2.30, p = 0.143$, and inspection time emerged as a marginally significant covariate $t(22) = 1.87, p = 0.075$. For the paper towels, subjects also spent more time examining the advertised brand compared to the five competitors; however, a MANOVA contrasting the Bolt brand to the five others indicated that the brand-by-advertising interaction was only marginally significant, $F(1,30) = 2.69, p = 0.11$.

Discussion

This first experiment replicates Deighton's (1984) finding of an advertising-by-product evidence interaction using a procedure similar to that found in commercial concept- and product-testing applications. Moreover, it used real products, and subjects physically inspected each brand much as they could in a retail environment. More importantly, the experiment isolated one of the necessary conditions for observing the interaction: ambiguity of the evidence. When product testing can provide only ambiguous evidence about product quality and performance, ad-induced assimilative processing can occur. This can have a profound impact on how consumers interpret the physical evidence; ambiguous evidence can increase the small belief change that typically may follow most advertising. However, when product experience provides unambiguous evidence, data-driven, accommodative processing will occur, and in this situation advertising will have little or no effect on how consumers interpret product experience. These results are similar to those found in consumer satisfaction/dissatisfaction research: slight differences between expectations and performance have led to assimilation (Oliver 1977; Olshavsky and Miller 1972) while large differences have produced contrast effects (Anderson 1973; Cohen and Goldberg 1970).

The product-testing behavior protocols provided direct evidence about the manner in which advertising influences product experience. The ad led to a reallocation of attention; subjects spent more time testing the advertised products. On the surface, this appears to support the position of Deighton (1984) and others (e.g., Snyder and Swann 1978) that people have a disposition to confirm during hypothesis testing. However, there are several reasons that the extra time devoted to the advertised target brand may not represent a bias to search for confirmatory evidence. First, as mentioned earlier, the hypothesis engendered by the ad was the hypothesis of the manufacturer, not the consumer. Confirmation bias often implies some motivation on the part of the subject to recruit evidence to support a personal position (Lord et al. 1979). But since the consumer and advertiser maintain a somewhat adversarial relationship (i.e., the persuasive intentions of the advertiser are easily recognized by the consumer), there

seems little reason to expect the consumer to consciously aid in bolstering the advertiser's claim during product testing. Instead, subjects may very well have been trying to disconfirm the claims advanced by the adversarial source. For the polo shirts category, subjects may have spent more time inspecting the advertised brand because they could not find disconfirming information due to the ambiguity of the evidence. After extensive tests of the target brand uncovered no disconfirming evidence, subjects may have seen no choice but to revise their beliefs in line with those posited in the ad. Without the ad, subjects did not have a uniform hypothesis to test during product inspection; thus interpretation of the ambiguous stimuli would have been more difficult, providing little information for revising prior beliefs about the target brand. For the paper towels category, subjects could find both positive and negative evidence quite easily. Because Bolt provided clear positive evidence while some of the other brands provided clear negative evidence, the amount of attention allocated to each brand during testing had little effect on product evaluations.

EXPERIMENT 2

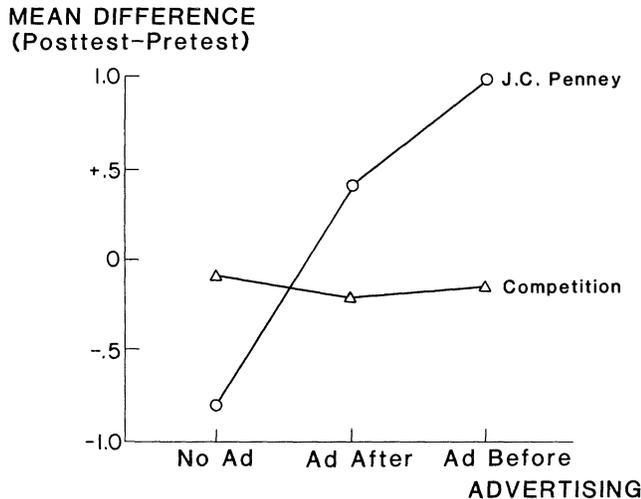
Experiment 2 served two purposes: to replicate the findings of the first study for the ambiguous evidence and to probe in more detail the advertising \times evidence interaction. The results from the first study suggest that the interaction occurs because the ad alters the manner in which subjects test the products (i.e., changes in inspection time). That is, the ad influences the encoding stage of the learning process. In this experiment, we contrasted this encoding hypothesis with a retrieval hypothesis, where subjects would use the advertisement as a memory cue at the time of judgment to selectively retrieve or reconstruct whatever ad-consistent, confirmatory information was actually encoded during product testing. Person perception research using priming of expectations manipulations typically have found strong encoding effects (Taylor and Crocker 1981). Assimilation of behavioral information to a personality label often has been found only when the personality trait precedes the behavioral information (Rothbart, Evans, and Fulero 1979; Srull and Wyer 1980); subjects recall more prime-consistent than prime-inconsistent information and also make more extreme prime-consistent judgments. However, there are cases where these assimilation effects have been found even when the prime comes after the behavioral information (Cohen 1981; Snyder and Uranowitz 1978), implying that reconstructive retrieval can also be operative.

Method

Procedure. The procedure was similar to the previous study with the following exceptions. All subjects inspected the polo shirts, resulting in only two of the

FIGURE D

MEAN DIFFERENCE SCORES BY BRAND (TARGET VS. COMPETITION) AS A FUNCTION OF TIMING OF ADVERTISING IN EXPERIMENT 2



four conditions from the ambiguous category, no-ad/testing and ad/testing. A third condition was added where subjects were exposed to the storyboard ads after inspecting the polo shirts. All instructions to the six sections of the experiment were identical to those used previously. All product-testing sessions were videotaped.

Subjects and Design. Subjects were 48 undergraduate and graduate students at the University of Chicago. They were paid \$5 for participating in the 45-minute experiment. There were two independent variables. Brand was a within-subjects variable: the J. C. Penney target compared with the five competitors. Advertising was a 3-level between-subjects variable: a no-ad control, ad before product testing, and ad after product testing.

Results

Figure D displays the mean difference scores for the J. C. Penney target compared to the competition. An overall MANOVA on the 6 brand by 3 ad level design was not significant, $F(10,80) = 1.20, p = 0.31$. However, the planned Helmert contrast comparing J. C. Penney to the five competitors indicated that the brand-by-advertising interaction was significant, $F(2,45) = 3.70, p = 0.032$. A one-way ANOVA on the difference scores for the J. C. Penney brand only was also significant, $F(1,45) = 4.12, p = 0.023$. A Newman-Keuls multiple comparisons test indicated that the ad-before condition was significantly greater than the no-ad control condition ($p < 0.05$), replicating the results in Experiment 1. Ad-after subjects were intermediate, and did not differ significantly from either the no-ad control or ad-before subjects.

TABLE 4

MEAN PROPORTION OF INSPECTION TIME ALLOCATED TO EACH BRAND

Brand	Mean proportion times		
	No-ad control	Ad after	Ad before
J.C. Penney*	.156	.152	.207
Calvin Klein	.180	.150	.167
Marshall Field	.160	.174	.123
Izod	.184	.155	.168
Nike	.177	.152	.153
Ralph Lauren	.143	.216	.181

NOTE: * = Advertised brand.

The product-testing behavior protocols were coded as in the first experiment. Table 4 displays the mean proportion inspection times for each of the brands in the three advertising conditions. Subjects spent the most time testing the J. C. Penney shirt in the ad-before condition, but spent consistently less time in the no-ad control and ad-after conditions. A MANOVA of the mean inspection times contrasting J. C. Penney to the other brands revealed a significant brand \times advertising interaction, $F(1,45) = 5.16, p = 0.01$. The difference score product quality ratings were re-analyzed including inspection time as a covariate. In contrast to Experiment 1, inspection time was not a significant covariate, $t < 1$, and the brand \times advertising interaction remained significant, $F(1,44) = 3.11, p = 0.054$. We do not know why inspection time appeared to mediate judgment in Experiment 1 but not in this experiment.

Discussion

Experiment 2 demonstrated that much of the variance associated with the interaction between advertising and product testing was due to assimilative processing of the stimuli at the time of encoding by the ad-before subjects. When subjects saw an ad for the target brand before testing the products, the ad encouraged subjects to reallocate their attention by spending more time testing the target brand, J. C. Penney. Because of the ambiguity of the information gained through product testing, ad-before subjects found some confirming information and little or no disconfirming information and therefore increased their product ratings of the target brand. When subjects saw the ad after product testing, they allocated their attention to the six brands in much the same way as the no-ad control subjects. This was expected since the two groups were functionally in the same position going into the product testing session. Unlike the no-ad control subjects, ad-after subjects also increased their ratings of the target brand after seeing the ad, though less than the ad-before subjects. This suggests that the advertising and product testing inter-

action also may involve some form of selective retrieval, with possibly a reinterpretation of the retrieved evidence in light of the ad claims. In this experiment, retrieval of ad-consistent information from product testing would not have been difficult since the ad was seen immediately afterwards; a delay between product testing and advertising might preclude such retrieval effects (Srull and Wyer 1980) by limiting recency in memory. The ad-before effect also is reminiscent of Swinyard and Ray's (1977) finding that selling before advertising can sometimes be more effective than advertising before selling.

GENERAL DISCUSSION

Consumers say that they do not believe the claims of advertisers, but at the same time they find advertising helpful in making better decisions. Consumers want to have proof of the validity of advertisers' claims. This research suggests that consumers do not require very convincing evidence in order to start believing what advertisers tell them. The evidence cannot directly contradict the advertised claims, but at the same time it need not be particularly diagnostic either. Why can consumers be so easily convinced by ambiguous evidence that cannot provide disconfirmation? One reason is that consumers have difficulty assessing the value of information and consequently rely on a "more is better" heuristic regardless of the diagnosticity of the decision environment (Snapper and Peterson 1971). But what may be more important are the goals that drive information search behavior. Consumers are motivated to make good decisions, not necessarily the best decisions (Simon 1955), and desire to identify sufficient rather than necessary rules for consuming (Hoch 1984). Consequently, if an advertiser makes a claim and the consumer discovers through product testing that the claim is valid (i.e., high in vitamins and minerals), the consumer may not really care whether other products also satisfy that claim (thereby showing that vitamins and minerals are diagnostically worthless attributes for discrimination). The consumer has identified a "good enough" alternative, eliminating pragmatic reasons for continued experimentation (Schwartz 1982; Tschirgi 1980).

In the remainder of this discussion, we will examine our results from a methodological perspective and then address some promotional strategy issues. Before doing so, however, it is important to point out several limitations of the current research. First, product category has been confounded with level of ambiguity. Although polo shirts and paper towels clearly differ in ambiguity, they also differ on other uncontrolled dimensions. In future research we plan on manipulating ambiguity experimentally within product category. Second, how applicable are these laboratory results to actual marketplace behavior? For instance, it is not clear how long advertising can influence product-testing behavior or

what will happen when competitive and comparative ads are present; interpersonal influence and other sources of information may mitigate the effect of advertising on product testing. Alternatively, advertising may encourage selective exposure to particular products, which might increase the magnitude of the advertising/evidence interaction.

Methodology

Concept- and new product-testing practitioners have reported that consumers sometimes give systematically higher evaluations to new products when they see a description of the product (storyboard) *and* are allowed to try or inspect the product than when they must base their evaluations solely on the product description (Pope 1981). A variety of explanations for this are possible, ranging from simple experimental demand inherent in the testing procedure (Lewis 1984) to dissonance/self perception accounts of product trial behavior (Scott and Yalch 1980). It is also possible that the interactive effects of advertising and evidence are operating as found in the present studies and in Deighton 1984. Since the consumers in these product-testing sessions often try only one product (the target) in a category, evidence from testing is almost guaranteed to be ambiguous, facilitating confirmation of the advertised claims. When interpreting such test results, it is important to recognize that advertising or product trial by themselves may not produce the same positive consumer response. Another methodological point concerns using amount of product trial to assess the impact of persuasion techniques. For example, Tybout, Sternthal, and Calder (1983) have used subjects' level of beverage consumption as an unobtrusive measure of persuasion—the more consumed, the more effective the persuasion technique. Although very clever, it should be recognized that this procedure at times may not measure the persuasiveness of different promotional techniques as much as the effect of the different techniques on hypothesis-testing activity. The persuasiveness of an ad and the effect of ads on product testing are interesting but different issues.

Promotional Strategies

Despite the aforementioned limitations in external validity, this research does suggest some practical considerations for designing promotional strategies. First, managers need to determine whether they are operating in a product environment that offers ambiguous or unambiguous evidence. The blindfold testing procedures outlined here could easily be applied to most consumer products and many industrial products. What should a manager do if the product category provides unambiguous evidence? Our research suggests that in many cases heavy expenditures on advertising may not provide the most efficient use of funds. If the brand is higher quality,

product sampling or other techniques to encourage trial may be more appropriate. Advertising may be helpful if it is geared to emphasizing price-quality tradeoffs (for lower quality or generic brands) or if it is designed to encourage product trial. An important caveat of our results is that real-world evidence about product quality will rarely be as unambiguous as that rendered by our experimental procedure. In most cases consumers do not have the opportunity, let alone the motivation, to make extensive side-by-side comparisons of multiple brands. Information is often collected sequentially, limited by retailers' product assortments. Shopping norms (and "do not touch" signs) may preclude extensive in-store testing, while monetary and time constraints often discourage purchase for purposes of experimentation. Moreover, if product testing does not occur until after purchase, consumers may be motivated to confirm a good buy (Ehrlich et al. 1957). It may be that all product evidence is ambiguous to some degree; further research is needed to understand the level of ambiguity necessary to maintain assimilative processing.

When evidence about quality in a product category is ambiguous, advertising has the potential to be quite persuasive, at least when coupled with some form of product evidence. The appropriate strategies probably depend on the market position of the particular brand (a surrogate for prior opinion) and the costs of collecting evidence (e.g., durables vs. nondurables). Low-share, "underdog" brands need to actively encourage consumers to go out and test the products (Hoch 1984). These brands have nothing to lose and everything to gain from getting consumers to test their ad claims in the ambiguous product environment. For low-cost products, encouraging one-shot product trial should not be difficult. And even if consumers show high brand inertia/loyalty, product sampling often is a viable strategy, possibly leading to an advertising-by-sampling interaction. For high-priced products, encouraging search is more problematic; here, manufacturers may have to take drastic steps to reduce the costs of trial. For example, several years ago when Chrysler was on the verge of bankruptcy, Lee Iacocca challenged consumers to actively test various cars and then "buy a better car if they could find one." Concurrently, Chrysler eased the burden of testing and actual product trial by granting rebates and long-term warranties. To promote one of its personal computers against strong competition, Apple recently offered consumers the opportunity to "test drive a Macintosh for 24 hours."

Our discussion of advertising low-share brands in ambiguous categories has emphasized a search-encouraging theme, exhorting consumers to go out and collect their own evidence. What about providing product-testing evidence directly in the ad? This is the aim of comparative ads. Although comparative ads have logical appeal, the evidence for their effectiveness is quite mixed (Gorn and Weinberg 1984), chiefly because they

encourage excessive counterarguing. Consumers (70 percent of them) simply do not believe them. Why? Our research suggests that these ads may not create the necessary feelings of control for the consumer (Langer 1975). Consumers know that a self-interested advertiser is in control of what information is being presented. Can advertisers create the illusion that the consumer is really in charge, as was the case during the product testing sessions? Radio and television advertising are naturally passive media, so creating an illusion of control using these media may not be possible. Print ads and direct mail require the consumer to be more involved and exert more effort, so feelings of control may be possible here.

High-share, "topdog" brands find themselves in a very different position. When evidence about quality is ambiguous, they will be vulnerable to attacks; thus they need to devise defensive strategies designed to discourage consumer search. Unless the high-share brand is clearly superior (unambiguously so), exhortations to go out and compare brands most likely will not help this brand (a ceiling effect) and very well could hurt, at least in the short run. The market leader cannot prevent consumers from hearing competitor claims but it can stress a "why change if it works" logic and emphasize the costs of search and the risks of experimentation. This is common practice in industrial selling situations, where purchasing agents must continually decide between a potential suppliers' lower price and the service/dependability track record of the current supplier. While low-share brands are trying to encourage consumer learning through accommodation of the evidence, the goal of high-share brands is to prevent learning by presenting an information environment where assimilation can continue unimpeded by the evidence.

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