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Procedural priming effects on spontaneous inference formation

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Abstract

Procedural priming refers to how the frequent or recent use of certain cognitive procedures on one task can lead to a greater propensity to use the same procedures on a subsequent task. In this paper, we demonstrate how procedural priming may be used to assess spontaneous inference formation in situations where the inference involves a relationship or rule. We do so in the context of the advertising cost–product quality rule, i.e., that “higher advertising expense implies higher product quality.” Prior research suggests that underlying the advertising cost–quality rule is a basic human attribution (the effort investment rule) that says, if someone invests a lot of effort in a cause, it implies a true belief in that cause. We prime the effort investment rule in an interpersonal context and show that this affects spontaneous generation of the advertising cost–quality rule in an advertising context.

Keywords

Consumer psychology, Advertising

1. Procedural priming effects on spontaneous inference formation

There is a good deal of research in psychology and marketing on how priming increases the accessibility of constructs or concepts. Priming a construct has been shown to affect interpretation or categorization of ambiguous behavior (e.g. Higgins, Bargh, & Lombardi, 1985; Higgins, Rholes, & Jones, 1977; Srull & Wyer, 1980), assimilation/contrast of evaluative judgments (e.g. Herr, 1989; Herr, Sherman, & Fazio, 1983), and the readiness with which the same concept or a related one is perceived (e.g. Eich, 1984; Tulving, Schacter, & Stark, 1982).

An additional effect of priming occurs from procedural priming (Higgins, 1989), or the priming of cognitive procedures. A cognitive procedure may be thought of as a set of cognitive operations that characterize the performance of a particular task. In other words, it represents the 'how' of task performance in cognitive terms. Procedural priming arises when the frequent or recent use of certain cognitive procedures increases the propensity to use the same procedures on a subsequent task (Smith & Branscombe, 1987). For example, Higgins and Chaires (1980) used procedural priming to help subjects solve the Duncker (1945) candle problem. The problem required subjects to attach a candle to a wall to provide light, given the following items – a candle, a box of thumbtacks, and matches. Because the points of the tacks were not sufficiently long to go through the candle, the only solution to the problem was to attach the box to the wall using a tack and then to attach the candle to the box. Subjects in one prime condition were shown pictures of objects that were described with phrases that contained "of" (e.g. "tray of tomatoes"), while in another prime condition, the same objects were described with phrases that contained "and" (e.g. "tray and tomatoes"). The authors found that, within the same time interval, 20% of subjects in the former condition and 80% in the latter solved the problem. Hence, it appears that because the "and" prime condition involved the use of cognitive procedures that were compatible with solving the problem, the persistent use of the same cognitive procedures when thinking about the problem facilitated problem solution. Similar effects have been reported in the area of social cognition. Fenigstein and Levine (1984), for instance, showed that subjects asked to generate self-referent sentences in a priming phase were more likely to make internal rather than external attributions on a subsequent task, compared to subjects who were asked to generate other-referent sentences. Bassili (1993) found that subjects who had earlier practiced behavior-trait inferencing were more likely to generate spontaneous trait inferences upon later encountering behavior descriptions.

Smith and his colleagues (Smith & Branscombe, 1987; Smith, Branscombe, & Bormann, 1988; Smith & Lerner, 1986) have theorized that such effects can be explained in terms of the ACT* model (Anderson, 1983). The model posits that cognitive procedures can be represented as productions in the form of 'if-then' pairs. Information that one encounters may be compared against the 'if' component of a production held in memory. If a match results, the action to be performed is described by the 'then' component of the production. Smith asserts that repeated use of the production speeds up the pattern match process and increases the likelihood that the productions will be executed. Furthermore, this process should not be content-specific; rather, it should generalize to new tasks so long as the same productions are involved (Smith & Lerner, 1986).

Although procedural priming has been used in psychology, it has not been applied in a marketing context, despite its potential as a managerial tool for inducing favorable product inferences. Consumers often make inferences about products, particularly when faced with incomplete information or when uncertainty about an attribute is present. For instance, consumers may draw product quality inferences based on a number of specific attributes, such as price (Broniarczyk & Alba, 1994b), warranty (Boulding & Kirmani, 1993; Broniarczyk & Alba, 1994a), brand name (Rao, Qu, & Ruekert, 1999) and advertising expenditures (Kirmani & Wright, 1989). Similarly, consumers may draw inferences from omitted conclusions (Kardes, 1988) as well as inferences of benefits/functions from attributes (Lee & Olshavsky, 1995).

Procedural priming can potentially influence the likelihood of consumers' making such inferences spontaneously, i.e., without conscious intention. To the extent that consumers draw product inferences of their own accord and without conscious intention, consumers are less likely to engage in counter-arguments or experience skepticism about the information. Hence, procedural priming may generate more favorable inferences about a company compared to more explicit procedures.

In this paper, we demonstrate how procedural priming may be used to assess spontaneous inference formation in situations where the inference involves a relationship or rule. We do so in the context of the advertising cost–product quality rule, i.e., that “higher advertising expense implies higher product quality” (Kirmani & Wright, 1989). According to this rule, consumers associate highly advertised brands with high quality products. Although research has shown that consumers use this rule in a variety of contexts (e.g. Kirmani, 1990 and Kirmani, 1997), there is no evidence that the inference may be spontaneous. If anything, prior work suggests that the rule is not well-practiced and that the inference is unlikely to be spontaneous (Broniarczyk & Alba, 1994b).

In the next section, we discuss current measures of spontaneity and describe how procedural priming may be used to assess the spontaneity of the advertising–quality inference. We then present some hypotheses, followed by a study to test our predictions. We conclude with implications for further research.

2. Spontaneity of inference

An inference is thought to be spontaneous when it occurs without explicit prompting and often without conscious intention (Newman & Uleman, 1989; Winter & Uleman, 1984). Much of the research in spontaneous inferencing has been in the domain of inferring personality traits. It has been shown, for example, that subjects spontaneously infer traits upon reading descriptions of trait-implying behavior, despite not being told to do so and despite a lack of awareness of having done so (e.g. Duff & Newman, 1997; Winter & Uleman, 1984; Winter, Uleman, & Cunniff, 1985). For instance, a trait such as “clever” may be spontaneously inferred from a behavior such as “The secretary solves the mystery halfway through the book.”

How then does one ascertain if a spontaneous inference has been made? The making of an inference can have at least three effects: (1) it can make the inferred construct or attribute more accessible in memory; (2) depending on the favorability or unfavorability of the inferred construct or attribute, it can affect the evaluation of the object to which the inference is directed; and (3) it can make the inferred construct an effective retrieval cue for that which originally prompted the inference. Consider a job candidate who has the distinction of being a member of the organization, Mensa. On encountering this information, an interviewer might spontaneously infer that the candidate is intelligent. Having made that inference, the attribute intelligent is likely to become accessible in memory, and given the desirability of intelligence in an employee, the interviewer is likely to be more positively disposed to the job candidate than if the inference had not been made. After a day of interviews, when the interviewer attempts to recall the various candidates he has seen, the word intelligent is likely to serve as an effective retrieval cue for the recall of this particular candidate and the fact that he was a member of Mensa.

Based on this logic, tests for spontaneous inference making have included measures of accessibility of the inferred construct, such as word-stem completion tasks (Whitney, Waring, & Zingmark, 1992), lexical-decision tasks (Zarate, Uleman, & Voils, 2001), reaction time tasks (Kardes, 1988; Stayman & Kardes, 1992), product choice (Broniarczyk & Alba, 1994a; Dick, Chakravarti, & Biehal, 1990), and cued-recall tasks (Duff & Newman, 1997; Winter & Uleman, 1984). Common to these various methods is that they offer indirect evidence that an inference has been made. This is in contrast to directly measuring the inference, such as by having the interviewer evaluate the intelligence of the job candidate.

The reason for relying on an indirect measure is that a direct measure might prompt an inference that would otherwise not have been made. That is, the inference might merely be the result of the measure, thereby hampering the derivation of any firm conclusions about spontaneity. However, indirect measures also have drawbacks. First, one cannot have absolute confidence that the construct or attribute in question was indeed inferred, and not some closely related construct or attribute. For instance, in the previous example, the interviewer might have inferred that the Mensa job candidate is nerdy (rather than intelligent). Since intelligence is closely associated with nerdiness, the intelligence construct might still be found to be accessible even though it was not inferred at the time. Second, not measuring the inference directly also prevents one from ascertaining the valence of the inference (e.g. the level of judged quality).

One way around these drawbacks is to measure the inference directly, while at the same time gathering indirect evidence for spontaneity. In the context of a product quality inference, for instance, this is done by measuring evaluations of product quality as well as the time taken to formulate that evaluation.¹ The rationale for measuring response times is as follows: Say a subject has inferred that a product is of high quality on being exposed to an ad for it. When subsequently queried about his perception of the product's quality, he would be able to simply retrieve his earlier judgment rather than have to compute one. Since retrieval operations are believed to be less cognitively demanding than computational operations, response times will be quicker if a spontaneous inference had been made (Kardes, 1988).

In the next section, we describe how procedural priming may be used to assess spontaneity of the advertising–quality inference.

3. Procedural priming and the advertising–quality inference

The advertising cost–quality rule is less practiced than other quality-related rules, such as “high price implies high quality.” For instance, Kirmani (1990) found that although subjects' quality judgments when exposed to expensive advertising reflected the use of the cost–quality rule, few subjects were able to verbalize the use of the rule. Similarly, Broniarczyk and Alba (1994b) demonstrated a low reliance on the advertising cost–quality rule when advertising cost information was provided along with price, despite covariation evidence in the data favoring an advertising cost–quality inference rule over a price–quality inference rule.

One way to make the rule more accessible would be to prime it, such as by exposing subjects to information that explicitly confirmed the correlation between advertising costs and product quality. Such a prime was used in Kirmani and Wright (1989) in the form of a magazine article that discussed the relationship between ad costs and product quality. Although such a prime accomplishes the intent of making the ad cost–quality relationship accessible, as mentioned earlier, its explicitness or lack of subtlety leads to concerns about potential demand effects and perhaps even counter-arguing on the part of subjects, especially if the message is perceived to be a persuasive communication.

Therefore, a procedural prime may be more appropriate. Previous research suggests that repeated use of a cognitive procedure on one task can lead to a greater propensity to use the same procedure and greater efficiency in using it on a subsequent task. Moreover, the new task need not bear the same specific content as the prime task for effects to be observed. Rather, the effects can generalize to new content provided the same cognitive procedures are applicable (Bassili, 1993; Smith et al., 1988; Smith & Lerner, 1986). In the case of behavior–trait inferences, for instance, the two tasks need not involve the same behaviors or inference of the same traits. What is primed are the general cognitive operations involved in making trait inferences from behaviors.

In the context of the advertising cost–quality rule, this suggests that the exact form or context of the prime need not be couched in terms of advertising or quality. As long as the cognitive operations underlying the inference rule are primed, inference formation ought to be facilitated. The advertising cost–quality rule involves perceptions about the amount of effort an advertiser is expending in promoting the product (Kirmani & Wright, 1989). Perceived advertising effort is thought to be indicative of a company's confidence or belief in the product's quality and sales potential, thereby mediating the advertising cost–product quality relationship (Kirmani, 1990). Abstracted from the context, the inference rule may be described as one that says, if a person is observed to have put in a substantial amount of effort into a particular undertaking, then it must be that he/she believes the undertaking to be a worthwhile one. We label this the effort investment rule.

The effort investment rule derives from an attribution process whereby one makes an inference about an unobservable characteristic of a person (e.g. belief in the value of an undertaking) based on the person's observable behavior (e.g. investment of effort in the undertaking). Attribution research (Heider, 1958; Jones & Davis, 1965; Kelly, 1967) has shown that there is a tendency for people to go beyond the information given to infer a cause for someone else's behavior, and this research has identified the rules and logic that appear to govern the manner in which these inferences are made. For instance, Dodson, Tybout, and Sternthal (1978) show that consumers may infer how much they like a product based on whether they paid full price or bought the product on deal. The more they paid, the greater the inferred liking. The effort investment rule is similar in that the belief that a company has expended a good deal of effort in a particular undertaking leads to the attribution that the company must believe in the value of the undertaking.

Based on procedural priming, we suggest that priming the effort investment rule will affect advertising cost–quality inferencing by increasing its spontaneity. For instance, describing the effort expended by an individual in an interpersonal context (e.g. contribution to charity) is likely to facilitate the advertising cost–quality inference during subsequent exposure to advertising cost information for a target product. Thus, priming in an interpersonal context will affect inferences made in a marketing context.

4. Hypotheses

To illustrate the applicability of procedural priming in our context, we consider a situation in which consumers make quality judgments after reading about a new product and the advertising costs associated with its introduction. To assess spontaneity, we vary the type of prime and the cognitive capacity at the time of judgment. Since retrieval operations are believed to require less cognitive capacity than computational operations, constraining cognitive capacity at judgment should slow responses to a greater degree when computation rather than retrieval is involved (Kardes, 1988).

The prime may be facilitative or suppressive, or there may be no prime. A facilitative prime is one that makes accessible cognitive procedures that are presumed to underlie the desired inference rule. A suppressive prime makes accessible cognitive procedures that suppress later use of the inference rule, e.g., by making salient competing attributions.

In our context, the facilitative prime makes accessible the inference rule that high investment of effort implies belief in the worthiness of an undertaking. The suppressive prime, in contrast, makes a competing inference rule – high investment of effort implies potential for personal gain – more accessible, thereby decreasing the likelihood that the effort investment rule will be used on a subsequent task.

We propose that spontaneous inferencing will occur in the facilitative prime condition only; however, quality ratings will be as favorable in the facilitative prime condition as in the no prime condition. Kirmani and Wright (1989) found that subjects in a no prime condition were just as likely to infer high quality from high advertising expense, as subjects in a prime condition that affirmed the tenability of the ad cost–quality relationship. In other words, it appears that people do make high quality inferences based on high advertising expense even without the aid of a prime, such that the presence of a prime does not boost inference use and quality ratings significantly. (However, it does not mean that the inference is spontaneous.) Thus, the facilitative prime may not lead to significantly greater use of the inference relative to the no prime condition. In contrast, we expect that the suppressive prime will lead to a lower incidence of use of the ad cost–quality inference given that it primes a competing attribution. This leads us to the following hypotheses:

H1a:

Compared to a no prime condition, a facilitative prime (which primes the effort investment rule) will lead to equivalent product quality perceptions that are no different.

H1b:

Compared to a facilitative prime or no prime condition, a suppressive prime (which primes a competing attribution) will lead to less favorable product quality perceptions.

Because subjects are expected to compute a quality judgment in the no prime and suppressive prime conditions and to retrieve a quality judgment in the facilitative prime condition, the imposition of a concurrent memory task at judgment is likely to affect the speed of quality judgments differentially across priming conditions. Specifically, the facilitative prime is expected to lead to greater spontaneous inferencing at the time of encoding, which, in turn, allows for a simple retrieval of that inference at time of quality judgment. The suppressive and no prime conditions, however, involve the computation of a quality judgment. Therefore, constraining cognitive capacity at judgment is expected to slow responses dramatically and to a larger extent in the no prime and suppressive prime conditions compared to the facilitative prime condition. This suggests an interaction between the level of cognitive capacity and the type of priming.

H2a:

Constraining cognitive capacity at the time of quality judgment in the facilitative prime condition will slow responses to a lesser extent than will constraining cognitive capacity in the suppressive prime or no prime condition.

H2b:

Constraining cognitive capacity at time of quality judgment in the suppressive prime condition will slow responses to the same extent as constraining cognitive capacity in the no prime condition.

To reiterate the logic behind the above hypotheses, on reading that a company has invested a large sum in advertising a target product, a subject in the facilitative prime condition (in contrast to one in the no prime or suppressive prime conditions) would be likely to spontaneously infer that the product is of high quality. Given that a quality judgment has already been made, the subject will simply retrieve that judgment when subsequently asked to evaluate product quality. Since retrieving a judgment is not as cognitively demanding as computing one (Kardes, 1988), the subject in the facilitative prime condition will be slowed to a smaller extent when his/her cognitive capacity is constrained as compared to a subject in the no prime or suppressive prime conditions.

Next, we describe an experiment designed to test these hypotheses.

5. Experiment

5.1. Design

The study was a 3 (Prime: no prime vs. facilitative prime vs. suppressive prime) × 2 (cognitive capacity at judgment: low vs. high) between subjects design. The facilitative prime condition primed the effort investment rule, while the suppressive prime scenario made salient an alternative motive (personal gain) as the reason for the expended effort. All three prime groups were exposed to the same high advertising cost information for a fictitious product. Also, approximately half the subjects in each prime condition made product quality judgments under conditions of constrained cognitive resources brought about by a concurrent memory load task. Quality judgments and the time taken to respond on the judgment task served as the dependent measures.

5.2. Independent variables

The prime was a scenario that described a charitable donation of time and money (i.e., effort) and varied whether the underlying reason for the effort was an intrinsic belief in the charity or something external. In the facilitative prime scenario, the donor was a woman who gave a larger amount of money to Habitat for Humanity than to other charities, and there were no external reasons stated or implied for the donation. Hence, the inference should be that the woman truly believed in the cause. Specifically, subjects read that “Marian typically gives about \$25 each to a number of different charities. To Habitat for Humanity (a nonprofit organization that builds houses for less well off people), she gives a much bigger donation. And she attends Habitat for Humanity events one weekend a month in her hometown.”

In the suppressive prime scenario, an external (noneffort) reason for the donation was implied. Specifically, the scenario stated that “Marian typically gives about \$25 each to a number of different charities. A man she's interested in works for Habitat for Humanity (a nonprofit organization that builds houses for less well off people). Marian gives a much bigger donation to Habitat for Humanity. And she attends Habitat for Humanity events one weekend a month in her hometown.” The alternative reason for the charity is personal gain, i.e., impressing a man. Finally, in the no prime condition, subjects did not see a description of charitable donations.

Cognitive capacity at judgment was manipulated using a concurrent task of digit rehearsal (Johnston, Greenberg, Fisher, & Martin, 1970; Naveh-Benjamin & Jonides, 1984). Subjects were asked to remember a series of seven digits that were flashed on the screen at the rate of one-half second per digit. They were told that, at some point, they would be asked to recall the exact order of the digits. In order to improve memory, they were advised to keep repeating the numbers to themselves. This manipulation of cognitive capacity occurred at judgment, i.e., when subjects were asked to assess quality, rather than at the time product information was presented. Subjects with high cognitive capacity did not have a concurrent task and were free to devote their full cognitive resources to evaluating the product's quality.

5.3. Pretests

A pretest on 76 undergraduates at a large North American university drawn from the same population as the main study demonstrated that the primes were successful in leading subjects to the intended attributions of effort. Subjects saw either the facilitative prime scenario or the suppressive prime scenario and then responded to the following two questions: (1) how much does Marian truly believe in Habitat for Humanity's cause? (1=not at all, 6=very much); and (2) compared to other charities, how important is Habitat for Humanity to Marian? (1=not at all important; 6=extremely important). The responses were averaged across the two items ($r=0.68$). The mean in the facilitative prime condition ($X=5.74$) was significantly different from that of the suppressive prime condition ($X=4.04$; $t(74)=8.41$, $p<0.0001$), suggesting that the manipulation was successful. Thus, the facilitative prime scenario conveyed the notion that exerting extra effort indicates an intrinsic belief in a cause, while the suppressive prime scenario suggested that the reasons for the extra effort may be something other than an intrinsic belief in a cause.

A second pretest assessed whether the primes affected mood. A possible confound could be that the facilitative prime may make people happier (since it depicts generosity), while the suppressive prime may make people feel skeptical or discouraged and that these differences could affect quality perceptions. Thus, we compared the two primes on a variety of mood measures, including skeptical, happy, sad, angry, interested, hopeful, afraid and discouraged. Thirty-two additional subjects from the same undergraduate population participated in the pretest in which they responded to these scales after reading one of the two scenarios. There were no significant differences across the two groups in terms of their mood after reading the scenarios (all $F_s < 1.4$). Therefore, the primes are equivalent on mood.

A final pretest was conducted on a separate undergraduate sample to ensure that the cost cue to be used in the description of the target product would have the intended effects on quality perceptions. To do that, one group of subjects was given the description with the cost cue of \$10 million while another was given the same description but with the cost cue excluded. Subjects then rated the product on quality, price and the amount of effort the company had invested in promoting the product on seven-point scales (1=very low/very inexpensive/very little effort, 7=very high/very expensive/a lot of effort). The results indicated that quality perceptions were more favorable with the \$10 million cue at a marginally significant level ($X=4.75$ vs. $X=4.25$, $t(46)=1.56$, $p<0.06$). There was no significant difference in price perceptions between the two conditions ($p>0.4$), thus providing assurance that the difference in quality judgments was not due to differing price perceptions. Finally, subjects in the \$10 million cost cue condition rated effort invested as higher ($X=5.5$ vs. $X=4.38$, $t(46)=3.12$, $p<0.01$). Hence, subjects inferred marginally higher product quality and thought the company invested greater effort in promoting the product when provided with advertising cost information.

5.4. Procedure

Subjects were 84 undergraduates from a large North American university who participated in a study for course credit in a Marketing class. On arrival, subjects were randomly assigned across treatments and were told that they were about to participate in a survey that solicited their opinion on a variety of issues that were not related to each other. The entire study was done on computer and run individually. The target product was a hypothetical new beverage called Quest.

Before proceeding with the first task, subjects were warned that they would not be able to change their responses once they had made them and hence, they should endeavor to be reasonably sure of themselves before making a response. These instructions were intended to yield greater uniformity in the decision criteria used by subjects.

The first task was a practice trial. Its purpose was to minimize variability in response latency by giving subjects practice with key press responses and to familiarize subjects with the digit rehearsal task. They were first given a description of a hypothetical product (Frazz potato chips), followed by instructions for performing the digit rehearsal task. The seven digits were then flashed, one at a time, on the computer screen. While holding these digits in mind, they responded to various questions pertaining to the product. Finally, they were asked to report the seven digits. This completed the practice trial.

The priming task was administered next. Subjects in the two prime conditions received the prime scenario, followed by the same two questions used in the pretest. These served as manipulation checks. Subjects in the no prime condition went on to the next task. All subjects then completed a filler task comprising a series of five trivia questions.

Subjects then read a description of Quest bottled water and were shown a sample print ad for the product. For subjects in the low cognitive capacity condition, instructions for the digit rehearsal task were then reiterated before a different set of seven digits was flashed on the screen. These subjects then judged the quality of the product and evaluated the effort invested by the company in promoting the product, while holding the digits in mind. Following that, they were asked to report the digits. Subjects in the high cognitive capacity condition were asked to judge the quality of the product and the effort invested by the company immediately following presentation of the product description and sample ad.

All subjects then responded to measures of the perceived advertising expenditure for the product and questions relating to their demographic profile. The entire study took 30 minutes.

5.5. Stimuli

The description of Quest contained information about its recent introduction in the US. The product was described as a sparkling spring water with real juice that was “completely quenching in muggy weather.” In addition, subjects were told that the product was priced competitively with other bottled waters, sold in convenience stores and supermarkets, and had a \$10 million introductory ad campaign. Hence, the description contained information about the product's attributes, its price, the distribution strategy for the product, as well as the advertising cost. A separate pretest on a sample of subjects from the same pool of university students revealed that the average perceived advertising spending for the category was \$7.2 million, an amount significantly lower than \$10 million.

Finally, the advertisement for Quest showed bottles of the beverage with the tag line “Introducing Strawberry and Lemon/Lime.”

5.6. Measures

5.6.1. Dependent measures

Both quality perceptions and response times were collected. Quality perceptions were measured with a question that asked what subjects thought about the overall quality of the product relative to other brands of bottled water. They responded on a seven-point scale (1=very low and 7=very high). Response time for the quality judgment was measured from the time the question was presented to the time a keypress was made.

5.6.2. Confound check

To ensure that perceptions of campaign cost were equivalent across conditions, perceived advertising cost was measured as the average of three seven-point scales (very low/high; too little/much; below/above average; Cronbach's alpha=0.78). Subjects were asked what they thought about the amount of money spent on advertising the product, compared to other bottled water products.

5.7. Results

5.7.1. Manipulation check

A 2×2 ANOVA using only the two primed conditions revealed a significant main effect of Prime on subjects' ratings of Marian's belief in the cause [$F(1,49)=16.95, p<0.0001$]. There were no other significant effects. Marian's actions were judged as more reflective of a true belief in the charity by subjects in the facilitative prime condition ($X=5.80$) than by subjects in the suppressive prime condition ($X=4.64$). This suggests that the prime was more likely to lead subjects to attribute effort to belief in the cause in the facilitative prime condition than in the suppressive prime condition. Hence, the manipulation was successful.

5.7.2. Perceived costs

There were no significant treatment effects on perceived costs. The sample mean was 4.39, suggesting that the level of perceived costs could not account for differences in quality judgments. See Table 1 for cell means.

Table 1. Mean quality ratings, perceived costs and quality response times as a function of prime and cognitive capacity

	Facilitative prime		Suppressive prime		No prime	
	Low cognitive capacity	High cognitive capacity	Low cognitive capacity	High cognitive capacity	Low cognitive capacity	High cognitive capacity
Quality rating	5.5	5.55	4.5	4.58	5.44	5.38
Perceived costs	4.4	4.64	3.88	4.17	4.48	4.9
Quality response time(s)	11.8	11.92	20.56	12.34	20.59	11.66

Note: All ratings are on seven-point scales.

5.7.3. Quality ratings

Hypothesis 1 suggests that quality perceptions should be equivalent in the facilitative prime condition compared to the no prime condition (Hypothesis 1a); and lower in the suppressive prime condition compared to either the facilitative prime or no prime condition (Hypothesis 1b). Thus, a main effect of Prime is predicted. Moreover, we expect the average of the quality perceptions of those in the facilitative and no prime conditions to be significantly greater than those in the suppressive prime condition.

A 3 × 2 ANOVA revealed a significant main effect of Prime [$F(2,78)=10.43, p<0.001$] on the perceived quality of Quest. There were no other significant effects. As expected, quality perceptions were more favorable in the facilitative prime and no prime conditions than in the suppressive prime condition [$X_{\text{facilitative prime}}= 5.52, X_{\text{suppressive prime}}= 4.54, X_{\text{no prime}}= 5.42; ((X_{\text{facilitative prime}} + X_{\text{no prime}}) / 2) \text{ vs. } X_{\text{suppressive prime}} : F(1,78)= 16.61, p<0.0001; X_{\text{no prime}} \text{ vs. } X_{\text{suppressive prime}} : F(1,78) = 20.82, p<0.0001$]. The facilitative prime and no prime conditions were not significantly different [$F<1$]. This is consistent with the notion that the suppressive prime suppressed inference use, leading to less favorable beliefs than in the other two conditions. In addition, the equivalence of the no prime and facilitative prime conditions suggests that subjects, when asked to make a quality judgment, do rely on advertising cost cues even when they are not primed to do so. Thus, Hypothesis 1a and b are supported.

5.7.4. Quality response times

Hypothesis 2 predicts an interaction effect between Prime and Cognitive Capacity on quality response times. A 3 × 2 ANOVA revealed significant main effects of Prime [$F(2,78)=3.22, p<0.05$] and Cognitive Capacity [$F(1,78)=12.50, p<0.0007$] and a significant interaction effect [$F(2,78)=3.14, p<0.05$] on the response times for quality ratings. Planned comparisons revealed that response times in the suppressive prime and no prime conditions were significantly slower when cognitive capacity was low than high [Suppressive prime: $X_{\text{high}}=12.34, X_{\text{low}}=20.56; F(1,78)=8.81, p<0.004$; No Prime: $X_{\text{high}}=11.66, X_{\text{low}}=20.59; F(1,78)=11.44, p<0.001$]. In the facilitative prime condition, however, response times were equivalent across cognitive capacity conditions, suggesting that low capacity subjects had spontaneously generated a quality inference [$X_{\text{high}}=11.92, X_{\text{low}}=11.80; F<1$]. These results are consistent with Hypothesis 2a and b.

In addition, under low cognitive capacity, response times were faster in the facilitative prime condition relative to the other two prime conditions [$X_{\text{facilitative prime}}= 11.80, X_{\text{suppressive prime}}= 20.56, X_{\text{no prime}}= 20.59; ((X_{\text{suppressive prime}} + X_{\text{no prime}}) / 2) \text{ vs. } X_{\text{facilitative prime}} : F(1,78)= 14.51, p<0.0003$]. When cognitive capacity was high, there were no significant differences in response times across the prime conditions (all $F_s < 1$).

Overall, the pattern of response times is consistent with the notion that the ad cost–quality inference is not ordinarily a spontaneous one. It can, however, be spontaneous when the cognitive procedures mediating the inference are primed.

6. Discussion

The main objective of the paper was to demonstrate the usefulness of procedural priming as a way of assessing an inference's spontaneity when the inference involves a relationship or rule. Our data show that spontaneous inferencing can indeed be influenced by procedural priming. Specifically, we primed the cognitive procedures expected to mediate the ad cost–quality inference (i.e., the effort investment rule) and found evidence that subjects had made quality evaluations without being prompted to do so. This reinforces earlier conclusions that cognitions about the amount of effort expended mediate the effect of advertising costs on quality perceptions.

One of the benefits of procedural priming was that it minimized the likelihood of demand effects. Since the prime was instantiated in an interpersonal rather than a marketing context, subjects would be unlikely to recognize the relationship between the prime and the subsequent task. A more direct prime, such as a magazine article informing subjects that ad costs and product quality are correlated (cf. Kirmani & Wright, 1989), could be argued to be more like a learning task, making assessment of spontaneity difficult.

The finding that priming an attribution of human behavior affects how consumers interpret a company's advertising expenditures is intriguing. It suggests that the ad cost–quality inference is not unique in itself, but is merely an instantiation of a more general attribution principle. This, in turn, implies that there may be instantiations of the principle in other contexts, such as when a politician goes the extra mile to endorse a particular candidate's bid for public office or when animal rights activists take extreme measures to rescue animals they consider to be abused. Moreover, this line of reasoning potentially explains the findings of Broniarczyk and Alba (1994b), who reported a low incidence of use of the ad cost–quality inference by subjects despite being presented with data that showed a high correlation between advertising expense and quality. Our findings suggest that the ad cost–quality inference may not originate from a perceived correlation between the two variables in the real world, but from a more general principle that says effort reflects one's belief. If it were derived from observations of correlation, one would expect the inference rule to be used in a domain-specific way, and its use would not be facilitated by procedural priming in a different domain.

Other marketing contexts in which procedural priming may be useful to assess spontaneity include other inference rules, such as “higher warranty indicates greater durability” (Boulding & Kirmani, 1993), an unknown brand that is vulnerable to consumer sanctions must have high quality (Rao et al., 1999), and higher coupon values imply higher prices (Raghubir, 1998). In addition, procedural priming may be used in the case of teaser ads, in which the initial ads in a sequence of ads may serve as a procedural prime, increasing the likelihood that the subsequent ad(s) will be processed in a particular way. For example, one might use the initial ads in the sequence to prime the effort investment rule, by presenting scenarios wherein one's belief in a certain cause or undertaking leads him/her to devote substantial effort to it. The final ad in the sequence might then communicate to consumers that the company had gone to great advertising expense to introduce the benefits of the product to the market. An issue for further research is whether such procedural priming effects will survive the typical time lag between ads.

Future research may also investigate the conditions under which procedural priming may generate spontaneous inferences. For instance, individual differences might moderate the findings reported here. Classic attribution theory makes the distinction between the attribution of behavior to situational causes and to internal dispositions (Heider, 1958). People have different attributional styles, according to their tendency towards the former or the latter. In fact, it has been shown that Chinese students are more likely to explain events in terms of situational causes, unlike their American counterparts, who are more likely to explain them in terms of the actor's disposition (Morris & Peng, 1994). In the present context, this suggests that consumers who favor situational explanations may be less likely to infer quality from advertising expense, since the effort investment rule that underlies the inference is one that assigns a dispositional cause (belief) to observed effort. In addition, procedural priming may be less successful at leading them to make spontaneous inferences of the type seen here.

We demonstrated the applicability of procedural priming in a single context; therefore, caution should be exercised before generalizing these findings to other contexts. Clearly, these results await extension to other inference rules or other marketing contexts. Moreover, somewhat at odds with our hypotheses is the null effect of prime on response latency when cognitive capacity was high. If spontaneous inferencing had indeed occurred in the facilitative prime condition, one would expect that there would be gains in response time as a result of being able to retrieve the quality evaluation instead of having to compute one. We suggest that in the low cognitive capacity conditions, the predominant response would be to retrieve an evaluation if one existed given that subjects were severely constrained in terms of cognitive resources. The same is not true of subjects in the high cognitive capacity condition. Their cognitive resources were at their disposal and their options were not constrained to the retrieval of an existing evaluation. Hence, it is possible that subjects may have chosen to engage in more deliberative analysis to arrive at an evaluation in spite of one already existing in memory. This is especially likely if subjects were highly motivated in providing an assessment (a condition that may have been bolstered by having informed subjects that they would not be able to change their responses) or if they did not hold the existing evaluation with confidence (see Fazio, 1990). Since these variables were not measured, we can only speculate that these conditions may have been met given that

subjects were likely to have found the product to be personally relevant (beverage to be launched in US cities), and they may have been hesitant to rely on an evaluation formed by way of a simple inference.

While consumers routinely go beyond the information they have about products by using a variety of inference rules, our understanding of these inference rules is far from complete. The findings reported here take us one step closer to a better understanding by demonstrating that priming the cognitive processes that underlie a rule may increase the likelihood that a spontaneous inference occurs. Future research may extend the findings of this paper and examine the value of procedural priming in generating spontaneous inferences in other contexts.

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References

- Anderson, J. R. (1983). *The architecture of cognition*. Cambridge, MA: Harvard University Press.
- Bassili, J. (1993). Procedural efficiency and the spontaneity of trait inference. *Society for Personality and Social Psychology*, 19, 200–205.
- Boulding, W., & Kirmani, A. (1993). A consumer side-experimental examination of signalling theory. *The Journal of Consumer Research*, 1(20), 111–123.
- Broniarczyk, S. M., & Alba, J. W. (1994a). The role of consumers' intuitions in inference making. *Journal of Consumer Research*, 21, 393–407.
- Broniarczyk, S. M., & Alba, J. W. (1994b). Theory versus data in prediction and correlation tasks. *Organizational Behavior and Human Decision Processes*, 57, 117–139.
- Dick, A., Chakravarti, D., & Biehal, G. (1990). Memory-based inferences during consumer choice. *Journal of Consumer Research*, 17, 82–93.
- Dodson, J. A., Tybout, A., & Sternthal, B. (1978). Impact of deals and deal retraction on brand switching. *Journal of Marketing Research*, 3, 223–232.
- Duff, K. J., & Newman, L. S. (1997). Individual differences in the spontaneous construal of behavior: Idiocentrism and the automatization of the trait inference process. *Social Cognition*, 15, 217–241.
- Duncker, K. (1945). On problem solving. *Psychological Monographs*, 58, 1–113.
- Eich, E. (1984). Memory for unattended events: Remembering with and without awareness. *Memory and Cognition*, 12, 105–111.
- Fazio, R. H. (1990). Multiple processes by which attitudes guide behavior: The MODE model as an integrative framework. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (pp. 75–109). San Diego, CA: Academic Press.
- Fenigstein, A., & Levine, M. P. (1984). Self-attention, concept activation, and the causal self. *Journal of Experimental Social Psychology*, 20, 231–245.

- Heider, F. (1958). *The psychology of interpersonal relations*. New York: Wiley.
- Herr, P. M. (1989). Priming price: Prior knowledge and context effects. *Journal of Consumer Research*, 16, 67–75.
- Herr, P. M., Sherman, S. J., & Fazio, R. H. (1983). On the consequences of priming: Assimilation and contrast effects. *Journal of Experimental Social Psychology*, 19, 323–340.
- Higgins, E. T. (1989). Knowledge accessibility and activation: Subjectivity and suffering from unconscious sources. In J. S. Uleman & J. A. Bargh (Eds.), *Unintended thought: The limits of awareness intention and control* (pp. 75–123). New York: Guilford.
- Higgins, E. T., Bargh, J. A., & Lombardi, W. (1985). Nature of priming effects on categorization. *Journal of Experimental Psychology: Learning, Memory and Cognition*, 11, 59–69.
- Higgins, E. T., & Chaires, W. M. (1980). Accessibility of interrelational constructs: Implications for stimulus encoding and creativity. *Journal of Experimental Social Psychology*, 16, 348–361.
- Higgins, E. T., Rholes, W. S., & Jones, C. R. (1977). Category accessibility and impression formation. *Journal of Experimental Social Psychology*, 13, 141–154.
- Johnston, W. A., Greenberg, S. N., Fisher, R. P., & Martin, D. W. (1970). Divided attention: A vehicle for monitoring memory processes. *Journal of Experimental Psychology*, 83, 164–171.
- Jones, E. E., & Davis, K. E. (1965). From acts to dispositions: The attribution process in person perception. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 2, pp. 219–266). New York: Academic Press.
- Kardes, F. R. (1988). Spontaneous inference processes in advertising: The effects of conclusion omission and involvement on persuasion. *Journal of Consumer Research*, 15, 225–233.
- Kelly, H. H. (1967). Attribution theory in social psychology. In D. Levine (Ed.), *Nebraska Symposium on Motivation* (Vol. 15, pp. 192–238). Lincoln, NE: University of Nebraska Press.
- Kirmani, A. (1990). The effect of perceived advertising costs on brand perceptions. *Journal of Consumer Research*, 17, 160–171.
- Kirmani, A. (1997). Advertising repetition as a signal of quality: If it's advertised so often, something must be wrong. *Journal of Advertising*, 26, 77–86.
- Kirmani, A., & Wright, P. (1989). Money talks: Perceived advertising expense and expected product quality. *Journal of Consumer Research*, 16, 344–353.
- Lee, D. H., & Olshavsky, R. W. (1995). Conditions and consequences of spontaneous inference generation: Concurrent protocol approach. *Organizational Behavior and Human Decision Processes*, 61, 177–189.
- Morris, M. W., & Peng, K. (1994). Culture and cause: American and Chinese attributions for social and physical events. *Journal of Personality, Social Psychology*, 67, 949–971.
- Naveh-Benjamin, M., & Jonides, J. (1984). Cognitive load and maintenance rehearsal. *Journal of Verbal Learning and Verbal Behavior*, 23, 494–507.
- Newman, L. S., & Uleman, J. S. (1989). Spontaneous trait inference. In J. S. Uleman & J. A. Bargh (Eds.), *Unintended thought* (pp. 155–188). New York: Guilford Press.

- Raghubir, P. (1998). Coupon value: A signal for price? *Journal of Marketing Research*, 35(August), 316–324.
- Rao, A., Qu, L., & Ruckert, R. W. (1999). Signaling unobservable product quality through a product ally. *Journal of Marketing Research*, 36(May), 258–268.
- Smith, E. R., & Branscombe, N. R. (1987). Procedurally-mediated social inferences: The case of category accessibility effects. *Journal of Experimental Social Psychology*, 23, 361–382.
- Smith, E. R., Branscombe, N. R., & Bormann, C. (1988). Generality of the effects of practice on social judgment tasks. *Journal of Personality and Social Psychology*, 54, 385–395.
- Smith, E. R., & Lerner, M. (1986). Development of automatism of social judgments. *Journal of Personality and Social Psychology*, 50, 246–259.
- Srull, T. K., & Wyer, R. S. (1980). Category accessibility and social perception: Some implications for the study of person memory and interpersonal judgments. *Journal of Personality and Social Psychology*, 38, 841–856.
- Stayman, D. M., & Kardes, F. R. (1992). Spontaneous inference processes in advertising: Effects of need for cognition and self-monitoring on inference generation and utilization. *Journal of Consumer Psychology*, 1, 125–142.
- Tulving, E., Schacter, D. L., & Stark, H. A. (1982). Priming effects in word-fragment completion are independent of recognition memory. *Journal of Experimental Psychology: Learning, Memory, & Cognition*, 8, 336–342.
- Whitney, P., Waring, D. A., & Zingmark, B. (1992). Task effects on the spontaneous activation of trait concepts. *Social Cognition*, 10, 377–396.
- Winter, L., & Uleman, J. S. (1984). When are social judgments made? Evidence for the spontaneousness of trait inferences. *Journal of Personality & Social Psychology*, 47, 237–252.
- Winter, L., Uleman, J. S., & Cunniff, C. (1985). How automatic are social judgments? *Journal of Personality & Social Psychology*, 49, 904–917.
- Zarate, M. A., Uleman, J. S., & Voils, C. I. (2001). Effects of culture and processing goals on the activation and binding of trait concepts. *Social Cognition*, 19, 295–323.