Schematic Processing of Brand Information: the Impact of Causally Central Attributes on the Responses to Brands

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ABSTRACT

A product category schema (PCS) may contain complex causal relationships among component attributes. Given this, the present study identifies causally central attributes (CCAs), i.e., attributes that tend to cause other attributes, and causally peripheral attributes (CPAs), i.e., attributes that tend to be caused by other attributes. Results from an experimental study suggest that consumers have more positive responses (i.e., attitudes and purchase intention) to a brand when the brand is positively associated with CCAs as compared to CPAs, primarily because CCAs facilitate consumers’ inferences of a brand’s missing attributes more than CPAs.

INTRODUCTION

Typically, consumers have limited information on a particular brand. For instance, an advertisement generally provides consumers with information on only a few attributes of a brand. Still, numerous studies have found that consumers may infer other attributes of a brand from the given information (Broniarczyk and Alba 1994; Chernev and Carpenter 2001; Dick, Chakravarti and Biehal 1990; Ford and Smith 1987; Huber and McCann 1982; Kivetz and Simonson 2000; Ross and Creyer 1992). In other words, consumers may “go beyond the information given” (Bruner 1950). Before making any inferences, however, consumers first need to represent or encode a brand into their knowledge. For instance, when seeing a particular brand (e.g., Cheerios), consumers may first identify it as a certain product category (e.g., a cereal) and then apply their general knowledge about the category, namely product category schema (PCS), to process specific information on the brand. Consequently, consumers’ responses to a brand (e.g., attitudes, purchase intention, etc.) can be affected by how they initially represent the brand (Moreau, Markman and Lehmann 2001).

To date, researchers have applied PCS to explain various aspects of consumer behavior, such as processing of schema-congruent or schema-incongruent messages (Areni and Cox 1994), framing (Kirmian and Wright 1989), recall of ad messages (Hunt, Bonfield, and Kernan 1986), brand positioning (Sujan and Bettman 1989), pioneering advantage (Niedrich and Swain 2003) and evaluations of sales people (Sujan, Bettman and Sujan 1986). Although different in their specific findings, these studies share the basic tenet: a PCS consists of key attributes and their interrelationships.

Yet, past studies have focused on the identification of component attributes, while ignoring the “structure” of these attributes. Given the critical role of a PCS, such a lack of findings on the structure of these attributes significantly limits our understanding of how a PCS affects consumers’ responses to a brand. As an attempt to improve our knowledge in this regard, the present study proposes that a PCS can be characterized as forming “causal relationships” among component attributes. Moreover, assuming the causal structure of a PCS, the present study identifies attributes that tend to cause other attributes (causally central attributes: CCAs) and attributes that tend to be caused by other attributes (causally peripheral attributes: CPAs). Finally, based on studies of causal inference, it is proposed that consumers have more positive attitudes and greater purchase intention towards a brand when the brand is associated with CCAs as compared to CPAs.

SCHEMA: A CAUSAL STRUCTURE OF KNOWLEDGE

Concerning the structure of a schema, past studies have often suggested that people develop a schema based on correlations or covariations among component attributes. For instance, Rosch and Mervis (1975) argue that attributes do not randomly spread across objects. Instead, attributes tend to appear in clusters. For example, objects with leaves tend not to have legs and fur, whereas objects with legs often have fur. People’s knowledge about objects, therefore, should reflect correlational relationships among attributes. Consistently, Medin, Alton, Edelson and Freko (1982) found that people were sensitive to correlations among attributes and based their subsequent cognitive processing, such as category judgment, on the correlations. Accordingly, in describing his theory of knowledge representation, Rumelhart (1980) conceives a schema as embodying expectations of what attributes co-occur.

This correlational view, however, has received numerous criticisms. Primarily, it has been argued that people not only have difficulty remembering correlated attributes (Day and Bellezza 1983) but often fail to notice correlations, if any, among attributes (Crocker 1981). Rather, people have a tendency to judge relationships among attributes based on their prior beliefs or expectations about how the attributes are interrelated (Chapman and Chapman 1967). Studies in cognitive psychology have identified such beliefs as naïve theories about causal relationships among attributes, such as “A enables B,” “A allows B” or “A determines B” (Murphy and Medin 1985). For instance, Murphy and Medin (1985) found that when categorizing medical symptoms of equivalent correlations (e.g., dizziness, earaches, high blood pressure, etc.), people tended to categorize symptoms into the same group to the extent to which they could develop causal links among the symptoms. Similarly, in the context of consumer behavior, Broniarczyk and Alba (1994) found that consumers inferred a missing attribute of a 35-mm camera (repair record) from the information on an attribute they believed to have a causal link to the missing attribute (warranty). This tendency was observed even if they learned that the missing attribute was strongly correlated to another attribute (shutter speed).

In sum, the above discussion suggests that a schema can contain people’s beliefs about causal relationships among component attributes and, therefore, form a complex causal structure.

Causal Status of Attributes

Given this causal structure of a schema, it can also be that certain attributes tend to cause other attributes, whereas certain attributes tend to be caused by other attributes. Of course, still other attributes can be isolated without making any causal relationships with other attributes (Ahn and Kim 2001; Ahn, Kim, Lassaline and Dennis 2000). Moreover, according to Ahn and Kim (2001), such a difference in the “causal status” of attributes is prevalent even among the attributes that are equivalently important in representing an object. Specifically, they found that for a particular disease (anorexia nervosa), people indicated several symptoms as important in representing the disease, such as 1) disturbed experience of body shape or denial of the problem (disturbance/denial), 2) fear of being fat even when underweight (fear), 3) refusal to maintain body weight at or above minimal levels (refusal), and 4) absence of the
menstrual period for more than 3 cycles (absence). Still, when asked to indicate their causal beliefs among symptoms including the important ones, “disturbance/denial” was found to play the most causally central role in structuring the overall relationships.

What does this imply to marketers? For a product category, consumers may consider certain attributes important, thus developing a PCS in terms of these attributes. Moreover, consumers may perceive causal relationships among the attributes such that performance of the product on one attribute affects its performance on other attribute(s). As a positioning strategy, however, marketers often associate their brand with a specific attribute(s) (e.g., Volvo with safety, Hyundai with warranty, etc). Given the difference in the causal status of attributes, this may suggest that a brand can be strongly associated with CCAs, CPAs or isolated attributes (Figure 1).

CAUSAL INFERENCE AND CONSUMERS’ RESPONSES TO A BRAND

As mentioned earlier, consumers generally have limited information on a particular brand. Still, consumers may go beyond the information given, presumably referring to the causal structure of a PCS. In other words, when seeing a brand associated with CCAs, consumers may infer other attributes that can be the effect of CCAs. In contrast, when seeing a brand associated with CPAs, they may infer other attributes that can be the cause of CPAs. Also, consumers’ inferences may be substantially limited for a brand associated with isolated attributes because these attributes make no causal relationships with other attributes and, therefore, provide no clues for making inferences.

Past studies, however, suggest that even for the brands associated with CCAs or CPAs, consumers’ inferences may differ in their likelihood and extent. First, people generally find it easier to make inferences from causes to effects rather than from effects to causes (Braine 1990; Rips 1994; Tversky and Kahneman 1982). Typically, for an effect (e.g., good score on a test), there may exist several alternative causes (e.g., intelligence of the examinee, easiness of the test, effective teaching of the instructor, or even a luck). Without additional information, therefore, people are less likely to attribute the effect to any single cause, which should inhibit their inferences. Moreover, according to the discounting principle (McBride 1998; Oppenheimer 2004), once an effect is attributed to a particular cause (e.g., luck in this case), people tend to discount the possibility that other causes might produce the effect. Consequently, even if people make inferences from effects to causes, their inferences should be limited in the extent. On the other hand, for a cause (e.g., effective teaching of an instructor), people may consider several effects as likely at the same time (e.g., good score on a test, high evaluation of the class, satisfaction of the students, etc.). In other words, contrary to the discounting principle, a cause need not be limited to a specific effect. Compared to making inferences from effects to causes, therefore, people’s inferences should be facilitated when people make them from causes to effects.

In the context of consumer behavior, this may imply that consumers make more inferences of other attributes and with greater confidence when they see a brand associated with CCAs as compared to CPAs, primarily because consumers make inferences from causes to effects in this case. Consequently, when the associated attributes are positive, consumers are more likely to favor a brand associated with CCAs as compared to CPAs, because consumers make more inferences of other positive attributes of the brand. Similarly, Maheswaran and Sternthal (1990) found that (expert) consumers had more positive attitudes toward a brand when they obtained information on specific attributes of the brand rather than only on relevant benefits. In other words, the information on
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specific attributes of a brand led consumers to elaborate on various benefits they might get from the brand and, therefore, positively evaluate the brand. Such elaboration, however, was limited when consumers were provided with the information only on benefits.

Based on the above discussion, the present study hypothesizes the following.

H1a: Consumers’ attitudes toward a brand are affected by their inference of the brand’s other missing attributes when the brand is positively associated with CCAs as compared to CPAs.

H1b: Consumers have more positive attitudes toward a brand when the brand is positively associated with CCAs as compared to CPAs.

H2a: Consumers’ purchase intention of a brand is affected by their inference of the brand’s other missing attributes when the brand is positively associated with CCAs as compared to CPAs.

H2b: Consumers have a greater intention to purchase a brand when the brand is positively associated with CCAs as compared to CPAs.

METHODOGRAPHY

To test the proposed hypotheses, two pretests and one experiment were conducted using student subjects. The pretests were intended to develop a PCS and to identify CCAs and CPAs from the PCS. An automobile was selected as the target product category. It was believed that an automobile consisted of many important attributes, thus containing complex causal relationships among the attributes. Moreover, given the participants’ familiarity with the product category, their causal beliefs about the attributes were less likely to be affected by personal factors. In the main experiment, participants read information about a hypothetical automobile brand’s performance on either CCAs or CPAs. Subsequently, they made inferences about the brand’s performance on other missing attributes. Finally, they provided their attitudes toward and purchase intention of the brand.

Pretests

In Pretest 1, 26 college students were asked to list all attributes they would consider important when purchasing an automobile. It should be noted, however, that an automobile includes many subcategories, such as sedan, sports car, economy car, etc. Moreover, for each subcategory, consumers may consider different attributes as important. Given this, attributes in the present study were obtained only for a specific type of an automobile: a sedan priced between $15,000 and $25,000. Based on the frequency of each listed attribute, the following 10 attributes were identified as important and, therefore, comprising the PCS of an automobile: 1) design, 2) safety, 3) gas mileage, 4) durability, 5) comfort, 6) capacity, 7) handling, 8) stereo quality, 9) warranty and 10) horsepower.

In Pretest 2, another group of 80 college students were first measured on their perceived importance of the 10 attributes using a single-item scale anchored at “least important (1)” and “most important (7).” Afterward, they were asked to indicate their causal beliefs about each pair of the 10 attributes. Specifically, they selected which of the four causal directions best described their causal beliefs about the paired attributes. These causal directions were: 1) attribute A causes attribute B; 2) attribute B causes attribute A; 3) attribute A and attribute B cause each other; 4) attribute A and attribute B do not cause each other. Subsequently, for each attribute, it was counted how many other attributes, on average, the participants believed to be the cause and effect of the attribute. From this measure, attributes that tended to be the cause of other attributes were identified as CCAs, i.e., design, durability, horsepower and capacity. In contrast, attributes were identified as CPAs when the attributes tended to be the effect of other attributes, i.e., safety, comfort, gas mileage, handling, warranty and stereo quality (Table 1).

Main Test

For the main test, an experiment was conducted with 170 college students. Participants were randomly assigned to one of two conditions. First, they were asked to measure the importance of the 10 attributes. Then, they read the information on a hypothetical automobile brand (a sedan priced between $15,000 and $25,000) concerning its performance on two attributes, either CCAs or CPAs. Specifically, using a similar rating system to Consumer Reports, each automobile was rated for each of the two attributes using a seven-point scale anchored at “worst in the market (1)” and “best in the market (7).” Both automobiles were positively rated (6 out of 7) for the two attributes. Additionally, Table 1 indicates that the attributes varied in importance. To control confounding due to this, therefore, “design” and “durability” were selected as the target CCAs, whereas “safety” and “comfort” were selected as the target CPAs. These were chosen because they were the four most important attributes.

After reading the information, participants were asked to infer the brand’s performance on the other eight missing attributes. In other words, for each of the eight missing attributes, they measured how “uncertain (1)” or “certain (7)” they were that the brand would perform positively. Subsequently, they indicated their attitudes toward and purchase intention of the brand. Attitudes were measured using a six-item, seven-point semantic differential scale: “bad/good,” “unappealing/appealing,” “unpleasant/pleasant,” “unattractive/attractive,” “boring/interesting” and “dislike/like” (Bruner, 1998). On the other hand, purchase intention was measured using a four-item, seven-point semantic differential scale: “unlikely/likely,” “improbable/probable,” “uncertain/certain” and “definitely not/definitely” (Bearden, Lichtenstein and Teel 1984). Finally, their subjective knowledge of an automobile was measured using a two-item, seven-point scale: “one of the least knowledgeable/one of the most knowledgeable” and “not at all familiar/completely familiar” (Brucks 1985).

RESULTS

Manipulation Check

For each automobile, mean importance of the two given attributes was computed. An ANOVA showed that the two brands did not differ in this measure (M_{CCAS}=6.19 vs. M_{CPAS}=6.15; F(1, 168)=.105, p=ns). In other words, the two brands were associated with the attributes of equivalent importance. Therefore, the manipulation was successful.

Hypothesis Testing

The measures of attitudes and purchase intention were reliable with $\alpha=.87$ and $\alpha=.89$, respectively. The measure of subjective knowledge was also reliable with $\alpha=.85$. In order to test H1b and H2b, an ANCOVA was conducted for participants’ attitudes toward and purchase intention of the two brands, including their subjective knowledge as a covariate. As hypothesized, participants had more positive attitudes toward the brand associated with CCAs (M_{CCAS}=5.16) as compared to the brand associated with CPAs.
(M_{CPA}=7.14, p<.008). Again, their subjective knowledge was found to have no impact: F(1, 167)=2.60, p=ns. Therefore, H1b was also supported (Table 2).

In order to test H1a and H2a, two multiple regressions were conducted for each brand. Each multiple regression included the importance measures of the two given attributes and the eight missing attributes as independent variables, whereas attitudes and purchase intention were the dependent variables. The importance measure of each missing attribute was weighted by participants’ inference of the brand. For the brand associated with CCAs, the analysis revealed that two missing attributes affected their purchase intention of the two brands. Consequently, it was speculated that causal status and importance of the given attributes would tend to cause other attributes, whereas other attributes would tend to be caused by other attributes. This expectation was evidenced in the present study from the PCS of an automobile (Table 1). Moreover, the present study found that even the attributes of equivalent importance differed in their causal status. In other words, two of the four most important attributes of an automobile, i.e., “design” and “durability,” tended to cause other attributes, whereas the other two most important attributes, i.e., “safety” and “comfort,” tended to be caused by other attributes. Consequently, it was speculated that causal status and importance reflected two different aspects of a product attribute.

As for the proposed hypotheses, the present study found that consumers’ responses to a brand (i.e., attitudes and purchase intention) could be affected by their inferences of the brand’s missing attributes. In other words, consumers had more positive attitudes toward and purchase intention of the two brands. Implications of these findings will be discussed in the next section.

**DISCUSSION**

The present study viewed a PCS as consumers’ knowledge about a product category that contained causal relationships among component attributes. Given this, it was expected that certain attributes would tend to cause other attributes, whereas other attributes would tend to be caused by other attributes. This expectation was evidenced in the present study from the PCS of an automobile (Table 1). Moreover, the present study found that even the attributes of equivalent importance differed in their causal status. In other words, two of the four most important attributes of an automobile, i.e., “design” and “durability,” tended to cause other attributes, whereas the other two most important attributes, i.e., “safety” and “comfort,” tended to be caused by other attributes. Consequently, it was speculated that causal status and importance reflected two different aspects of a product attribute.

**TABLE 1**

Mean Causes/Effects and Importance of the Attributes

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Causes</th>
<th>Effects</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>design*</td>
<td>5.94</td>
<td>2.09</td>
<td>6.18</td>
</tr>
<tr>
<td>durability*</td>
<td>3.65</td>
<td>3.55</td>
<td>6.42</td>
</tr>
<tr>
<td>capacity</td>
<td>3.91</td>
<td>1.95</td>
<td>4.65</td>
</tr>
<tr>
<td>horsepower</td>
<td>3.20</td>
<td>2.14</td>
<td>4.51</td>
</tr>
<tr>
<td>safety*</td>
<td>2.74</td>
<td>3.89</td>
<td>6.34</td>
</tr>
<tr>
<td>comfort*</td>
<td>1.45</td>
<td>3.96</td>
<td>5.98</td>
</tr>
<tr>
<td>warranty</td>
<td>1.77</td>
<td>2.92</td>
<td>5.65</td>
</tr>
<tr>
<td>gas mileage</td>
<td>1.57</td>
<td>2.92</td>
<td>5.63</td>
</tr>
<tr>
<td>handling</td>
<td>3.24</td>
<td>3.30</td>
<td>5.63</td>
</tr>
<tr>
<td>stereo quality</td>
<td>0.99</td>
<td>1.74</td>
<td>4.86</td>
</tr>
</tbody>
</table>

* Four most important attributes

**TABLE 2**

Attitudes toward and Purchase Intention of the Brands

<table>
<thead>
<tr>
<th>Brand w/CCA</th>
<th>Attitudes</th>
<th>Purchase Intention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5.16</td>
<td>4.67</td>
</tr>
<tr>
<td></td>
<td>(.79)</td>
<td>(.93)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Brand w/CPA</th>
<th>Attitudes</th>
<th>Purchase Intention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.76</td>
<td>4.05</td>
</tr>
<tr>
<td></td>
<td>(1.03)</td>
<td>(1.08)</td>
</tr>
</tbody>
</table>

* Standard deviation in parentheses

Therefore, H2a was not supported. Interestingly, though, none of the given attributes were found to influence participants’ attitudes toward and purchase intention of the two brands. Implications of these findings will be discussed in the next section.

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reported above at least partially support the implication. That is, participants indeed translated their inferences of the missing attributes to their attitudes toward and purchase intention of the brands with a greater tendency for the brand associated with CCAs as compared to CPAs.

More interestingly, the regression analyses showed that participants based their responses to the brands solely on their inferences of the missing attributes rather than the given attributes. This may suggest a critical aspect of making inferences such that when making inferences, consumers shift their attention from the given information to their inference and, therefore, rely more on the inferred attributes when responding to a brand. Yet, this result can be attributed to the design of the present study. Specifically, the present study “asked” participants to make inferences of other missing attributes, thus making participants more sensitive to their inferences. Obviously, a future study with an improved design is required for a clear understanding.

CONCLUSION

As discussed earlier, consumers’ inferences of a brand’s missing attributes can be affected by their initial representation of the brand. As a type of representation, the present study examined the nature of a PCS and its impact on consumers’ responses to a brand. Other than a PCS, numerous researchers have also referred to the associative network as an alternative way of representing a brand (see Keller (1998) for a detailed review). Similar to a PCS, the associative network represents a brand as a network of nodes or relevant concepts that are interrelated with different strength. When seeing a particular brand, therefore, consumers first recall a concept(s) that is most strongly related to the brand. Then, this initial activation spreads out to other strongly related concepts.

Contrary to a PCS, however, the associative network is episodic in nature. In other words, consumers develop the associative network of a particular brand through their individual experiences of the brand, which may not necessarily be congruent with their causal beliefs. Consequently, within the associative network, consumers may adopt quite a different strategy for making inferences. Moreover, given the episodic nature of the associative network, consumers are more likely to represent a brand with the associative network rather than a PCS as they become more familiar with the brand. An interesting future study might be, therefore, to investigate the mechanism under which consumers shift their representation of a brand from a PCS to the associative network as well as their strategy for making inferences.

REFERENCES


