Computer Process Tracing Method: Revealing Insights Into Consumer Decision-Making

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Abstract

This paper challenges our long held understanding of consumer decision-making through the presentation of new empirical evidence. Marketers, and researchers alike, must understand there is consumer heterogeneity in decision-making and that consumer decision-making often involves multiple phases. Guided by image theory, the computer process tracing method described in this paper provided insight into the attributes considered by consumers and the influence of these attributes on the alternatives that were eliminated or chosen by consumers. This research raises significant implications for marketers with empirical evidence that makes the striking revelation that when a substitute has attributes that are very close to the leading brand it is not likely to be chosen.

Keywords: Image theory, consumer decision-making, screening, choice, durable goods

Background

Consumers are faced with an explosion of choices today and as a result the complexity of consumer decisions is increasing. Research suggests that as the number of alternatives increases, consumers may make one or more screening decisions to eliminate unsuitable alternatives prior to making the final choice (Kardes et al. 1993; Klein and Yadav 1989; Russo and Leclerc 1994) and that phased decision-making can occur when there are as few as four alternatives (Roberts and Lattin 1991). To simplify their purchase decisions, consumers often have to eliminate a large number of alternatives before making their choice from a smaller group of brands, which implies a two-phased decision process. The latter process includes a screening decision and a choice decision. Researchers have hinted that decisions may be more complex. For example, Russo and Leclerc (1994) have suggested there may be as many as three decision phases following research that tracked eye movements for decisions in three fast moving consumer good categories. While researchers in an organisational behaviour context have found empirical support for multiple decisions phases in both relatively stable (Montgomery 1993), fast-changing (Klein et al. 1993), and complex (Pennington and Hastie 1993) environments there still exists a lacuna in relation to supporting a multi-phased structure in a marketing context.

Research Problem

Image theory has been used by organisational behaviour researchers (Beach 1990; Beach 1993; Beach 1998) to describe decision-making. Image theory suggests that there are two kinds of decisions – screening and choice. Screening is a process of establishing or assembling a choice set. Choice is a process of making a final purchase decision from a given choice set. A screening decision occurs when an alternative is included or excluded from consideration. A choice decision occurs when a final purchase decision is made.

Utilising a novel computer process tracing method this research extends the marketing literature by making the proposition that consumers may conduct multiple screening decisions
prior to the final choice decision in a multi-phased decision process. This research provides useful insights into the complexity of consumer decision-making.

Methodology

A convenience sample of two hundred and seventy two Chinese adults from two major cities in the Special Economic Zone of the People’s Republic of China participated in this research. Respondents were drawn from professions teaching, the police force, government and medical. Professionals were deemed to represent the Chinese consumers who would be economically capable of purchasing an air conditioner. Ten responses were not completed and were not deemed suitable for analysis, resulting in 262 usable responses. Chinese consumers are the primary interest of this research due to the scarcity of consumer research in developing countries generally and perhaps more especially in mainland China where consumers have moved from an environment of having virtually no choice in consumer products to one of a proliferation of choices over the last twenty years (Ouyang et al. 2000).

Respondents were asked to consider the purchase of an air conditioner for an 18-square metre room from nine available alternatives. The nine air conditioners presented to respondents were organised in the same order, that is, from A to I. Table 1 summarises the characteristics of the nine air conditioners depicted along the six attributes described for respondents. Among the nine options, only C, F and I had the appropriate cooling capacity for an 18 metre square room. Air conditioners C, F and I can be considered “optimal” alternatives, with F the best alternative. Air conditioners A, D and H are the “extreme” alternatives because they possess extreme values on five attribute dimensions. Air conditioners B, E and G belong to the “value” group. They had better performance than C, F and I on the criteria of energy efficiency ratings, indoor noise levels and compressor warranty. For respondents preferring to accept these benefits despite a lower cooling capacity, air conditioners B, E and G represent good value for money.

Table 1: Alternatives available for choice decision

<table>
<thead>
<tr>
<th>Alternatives</th>
<th>Price</th>
<th>Cooling capacity</th>
<th>Energy efficiency rate</th>
<th>Indoor noise level</th>
<th>Timer</th>
<th>Compressor Warranty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extreme Value</td>
<td>Optimal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Lowest</td>
<td>Lowest Power</td>
<td>Lowest</td>
<td>Lowest</td>
<td>Lowest</td>
<td>Lowest</td>
</tr>
<tr>
<td>D</td>
<td>Highest</td>
<td>Highest Power</td>
<td>Highest</td>
<td>Lowest</td>
<td>Highest</td>
<td>Lowest</td>
</tr>
<tr>
<td>H</td>
<td>Above average</td>
<td>Well above average</td>
<td>Above average</td>
<td>Below average</td>
<td>Highest</td>
<td>Highest</td>
</tr>
<tr>
<td>B</td>
<td>Average</td>
<td>Average except G</td>
<td>Average except B</td>
<td>Lowest</td>
<td>Highest</td>
<td>Highest</td>
</tr>
<tr>
<td>E</td>
<td>Below average</td>
<td>Within the appropriate range</td>
<td>Below average</td>
<td>Highest</td>
<td>Lowest</td>
<td>Lowest</td>
</tr>
<tr>
<td>G</td>
<td>Below average</td>
<td>Below average</td>
<td>Below average</td>
<td>Highest</td>
<td>Lowest</td>
<td>Lowest</td>
</tr>
<tr>
<td>C</td>
<td>Below average</td>
<td>Below average</td>
<td>Below average</td>
<td>Highest</td>
<td>Lowest</td>
<td>Lowest</td>
</tr>
<tr>
<td>F</td>
<td>Below average</td>
<td>Below average</td>
<td>Below average</td>
<td>Highest</td>
<td>Lowest</td>
<td>Lowest</td>
</tr>
<tr>
<td>I</td>
<td>Below average</td>
<td>Below average</td>
<td>Below average</td>
<td>Highest</td>
<td>Lowest</td>
<td>Lowest</td>
</tr>
</tbody>
</table>

Computer process tracing method

To accurately represent or describe the functionality of consumers’ decision process requires a methodology and data intercept mechanism that captures activity during the decision process, without constraining the respondent’s ability to drive the process. Computer process tracing methods have been used to compare actual supermarket choices with simulated choices (Burke et al. 1992). Computer process tracing methods allow the study of issues that have not been previously explored (Burke et al. 1992), in this instance the number of decision phases. The computer simulation employed a ‘mouse click’ data capture (both mouse clicks and keystrokes were recorded) to trace and store each respondent’s information search and
decision activity. The computer process tracing method will now be explained to assist the reader to understand the methodology used in this research.

Respondents started with a main menu screen (see figure 1) linked to individual model screens (see figure 2). To acquire more information about a model a respondent had to click on its name to enter into the model screen. This click was captured in a computer log. The main menu screen also acted to remind respondents about their previous evaluations of air conditioner models. Finally, the main menu screen was used for purchase decisions via a mouse click on both the name of the model and the “purchase” button to exit the decision task.

Figure 1: Main menu screen

Figure 2: A model screen

Figure 3: More information

To overcome the claim that choice set is not an observable construct (Andrews and Manrai 1998) the computer process tracing method had the flexibility to allow both alternative- and attribute-based processing; respondents could select and apply decision strategies. Previous decision studies have used a single page (paper-based) or a single screen (computer) containing information in a matrix form (Beach and Strom 1989; Bettman and Park 1980; Payne, Bettman and Johnson 1993; Teder 2000). This research included a second computer screen layer and incorporated pop up screens to allow respondents to 1) examine each air conditioner one by one (alternative-based), 2) compare the values of each attribute across the models (attribute-based), or 3) use both alternative- and attribute-based processing in a single decision process.

Respondents could obtain additional information if required to assist their decision-making (see figure 3). As illustrated in figure 2 respondents could reject an alternative by clicking “doesn’t suit my needs” or accept it for further consideration by clicking “suits my needs”. In summary, respondents could make a simulated decision using mouse clicks. Respondents were free to go to any screen without constraint and to exit the program at any point.

Figure 4: Pop-up screen to enable attribute comparison

To compare the values for an attribute respondent’s had to click the attribute. As illustrated in Figure 4 a pop up screen was generated for the attribute. Respondents could then choose to move to another alternative following their attribute comparison and this is again illustrated in
figure 4 where a respondent clicked “Barbara”. Note that once clicked (in this case in the Anna screen) the price for Barbara was then shown for the respondent. Again all the clicks and their sequence were captured on the computer log. When the final choice was made, a corresponding record of the respondent’s entire decision process was generated and stored in a database.

**Results and discussion**

Figure 5 shows the percentage of respondents who have chosen each alternative; the alternatives were ordered from the least chosen (left) to the most chosen (right) alternative. Figure 6 shows the percentage of respondents by the number of decision phases used within the decision process.

**Figure 5: Alternatives Chosen**

Figure 5 shows that the three optimal alternatives C, F and I were positioned far apart at both ends of the X-axis. F was the best alternative in the optimal group and this was the brand chosen by the largest percentage of the respondents (23.66%). C was the least chosen alternative 2.29%, and I was chosen by a very low 6.49% of respondents. Interestingly, more than two thirds of respondents (67.56%) chose sub-optimal alternatives. Figure 6 indicated that approximately one in three respondents made a single choice decision. Approximately one respondent in seven made a two-phased decision incorporating one screening phase and one choice phase. Approximately one-half of respondents made a multi-phased decision involving two or more screening phases followed by a choice phase. Figure 7 summarises the average number of decision phases used for each alternative chosen.

**Figure 7: Average decision phases for alternative chosen**

The decision phases for alternative A, on average involved two phases. Alternative A was listed first in the computer program and the results for alternative A are likely to be an artefact of the layout of the alternatives. It is difficult to draw conclusions for alternative A. However for the remaining alternatives three clear findings emerged. Figure 7 demonstrates that for alternatives D and H, which are the two “extreme” alternatives on the quality-related attributes, the decision-making was mainly
single-phased. For the three optimal alternatives C, F and I, the decision-making was mainly two-phased while the decision making for alternatives B, E and G, which were neither the “extreme” nor the “optimal”, was mainly multi-phased.

A considerable amount of research into consumer decision-making has implied a screening construct in the choice process (Nedungadi 1990). The results of this research suggest that the inclusion of screening in consumer decision-making models will enhance the explanatory potential of consumer decision-making models because many consumer decisions involve multiple phases. Specifically, the process tracing method developed for this research illustrated that consumers could use one or more than one screening decision to eliminate unsuitable alternatives prior to the final choice decision. It is interesting that up to eleven decision phases were disclosed by this research, far beyond the two-phased models currently incorporated in current decision research. Indeed, it is likely that more screening will occur in a real-world setting where the amount of alternatives greatly surpass the nine available options in the research experiment (Shocker et al. 1991). In this research, different consumers approached the same decision problem using quite different decision processes and decision outcomes. This contrasts with previous research that was mainly single-phased (e.g. Kivetz and Simonson 2000). One of the most significant findings of this research is that the alternative chosen impacted the approach towards decision-making, and vice versa. Specifically, consumers were likely to use simple heuristics for alternatives that had a dominant attribute e.g. consumers selected alternative D, which had the highest price. Consumers who have chosen the optimal alternatives did so with less decision effort when compared to consumers who chose the sub-optimal alternatives.

Marketing implications

This study raises significant implications for marketers. Firstly, marketers must ensure that their products are positioned away from the leading brand and where possible they should offer a few “stand out” attributes to gain entry into consumers’ consideration sets and increase their chance of being chosen. Consider alternatives C and I, which were quite similar to alternative F (the optimal alternative). While C and I were considered they were not chosen as often as F. In today’s crowded markets, when an alternative has attributes that are very close to the leading brand, it is not likely to be chosen. Marketers, and researchers alike, must understand there is consumer heterogeneity in decision-making. In a simplified setting, consumers used all of the three different types of decision-making: single-phased, two-phased, and multi-phased. Use of a computer process tracing method in market research can help marketers to identify the products that consumers consider, and how alterations to the marketing mix impact both product consideration and choice.

Conclusions and future research

This study of consumer decisions for an air conditioner provides new insights into consumer decision processes. Previously, consumer decision-making has been considered a two-phased process (Russo and Leclerc, 1994). Our empirical evidence suggests that consumer decisions are far more complex, involving as many as ten or more decision phases. In this study, respondents were asked to perform the task in a relatively stable experimental environment, whereas in real-life decision-making, consumers are likely to be influenced by external factors such as time pressure, feeling more involved in the decision-making, being faced with more alternatives, and as a result it is possible they will make even more screening decisions before making a final choice. Future research could observe consumer decision making in a real environment. The methodology used in this research greatly improves our understanding of the attributes considered by consumers and the influence of the attributes on the alternatives.
that are eliminated and chosen by consumers. There is also an important need for researchers to develop a broader understanding of a multi-phased consumer decision-making process in which multiple decision strategies are used within and across the decision phases.

References


