

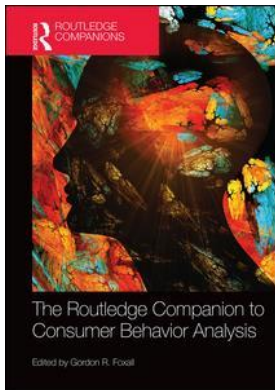
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Gordon R. Foxall

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Asle Fagerstrøm, Valdimar Sigurdsson

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Part II

Behavioral economics meets marketing science

Experimental analyses of consumer choices

Asle Fagerstrøm and Valdimar Sigurdsson

Introduction

Marketing can be seen both as a sub-discipline of economics, the science of how organisms use scarce resources, and psychology, the science of overt and covert behavior. Traditionally, marketing has been described as an area for application for its main disciplines (Foxall, 1999). It has been seen as a business philosophy concentrating on how the organization can work as one entity to maximize revenue by fulfilling consumers' current and future wants (e.g., Jaworski & Kohli, 1993; Kohli & Jaworski, 1990; Narver & Slater, 1990). This entails the use of consumer behavior analysis in marketing management.

Marketing is based on behavioral function, which is interested in the effects of incentives and penalties in the form of the fulfillment of needs and wants. As such, it can be defined as "the study of the behavior of consumers and marketers, especially as they interact" (Foxall, 2001, p. 165) and the research of their bilateral workings on each other. The functional school involves enquiring about the consequences of behavior that make behavior analysis particularly relevant to marketing research. If theories of consumer behavior are used, they are most often taken from one of the basic disciplines (for example, psychology and economics) and applied to a particular marketing theme. It could, however, benefit marketing and its application if the environmental-behavior laws and principles of the behavior of marketers and consumers could be found, analyzed and made clear. By focusing on description, prediction and control of behavior, different theories, methods and applications can be compared in the search for economical and comprehensible descriptions of the behavioral classes of marketing.

Behavior analysis has its strongest roots in experimentation and inductive research methods, and by the rejection of dualism it can be defined as a natural science (Baum, 2005). It is also a selection science (Pierce & Cheney, 2004), and research must be framed to encompass the dynamic complexity associated with evolving systems, whether the systems are biological, behavioral or social. The unified conceptual framework of behavior analysis and selection sciences may provide a way to integrate data from several disciplines. One obvious discipline that is of interest to behavior analysis is psychology. However, other disciplines that are of legitimate scientific interest are biology, education, sociology, general networks theory, political science, anthropology, medicine, psychiatry, social work and economics. Within economics, relevant research programs are behavioral economics (e.g., Bowles, 2004), behavioral ecology of consumption (Rajala & Hantula, 2000) and consumer behavior analysis (Foxall, 1990/2004, 2007).

This chapter focuses on how to design experiments to understand, predict and influence consumer choices. The focus is mainly consumer behavior analysis, but its presentation of experimental analysis of consumer choice is also relevant for behavioral economics and behavioral ecology of consumption. An introduction to both laboratory and field experiments will be given together with examples from the behavioral perspective model research program. Some specific issues related to microworlds, the use of technology in designing and administering laboratory experiments, and the use of in-store experiments of consumer brand choice will be discussed in more detail.

Consumer behavior analysis

Consumer behavior analysis takes behavior analysis as its initial foundation (Foxall, 2010). The choice of behavior analysis stemmed from its minimal deployment of theoretical terms, its avoidance of cognitive terminology, and its insistence on describing behavioral responses exclusively by reference to environmental stimuli. The behavioral perspective model is a consumer behavior model that is based on the principles from behavior analysis. The model was first described in *Consumer Psychology in Behavioral Perspective* (Foxall, 1990/2004), and was recently reviewed in *Explaining Consumer Choice* (Foxall, 2007).

The dependent variable

The behavioral perspective model accounts of purchase and consumption conceptualize behavior at a molar level rather than that of the individual response (Foxall, 2010). Figure 2.1 shows that the main perspective of the behavioral perspective model is the consumer situation which exerts a direct influence on the shaping and maintenance of consumer behavior (the dependent variable) in specified surroundings (Foxall, 2007).

The dependent variable in consumer behavior analysis is the rate of response. However, consumer behavior analysts do not talk about behavior as if it is composed of discrete responses. They consider consumer behavior as a performance that follows a specific stimulus and/or

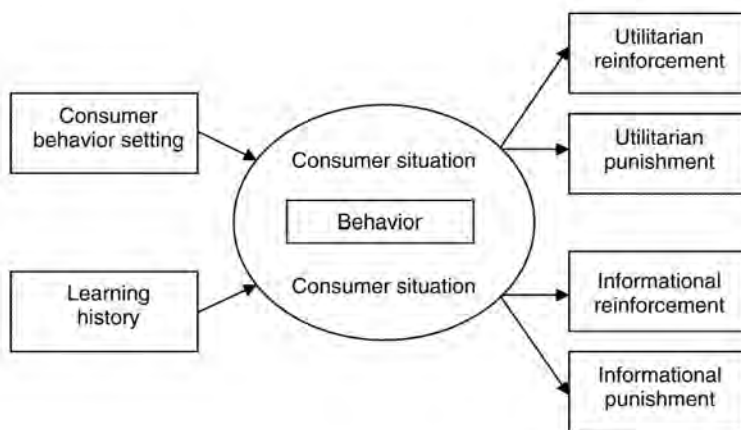


Figure 2.1 The Behavioral Perspective Model

Source: Foxall (2010). *Interpreting Consumer Choice: The Behavioral Perspective Model*. New York: Routledge. Reproduced by permission

results in a particular consequence. When a response is strengthened or weakened by the events or stimuli that follow the consumer's response, it is called operant behavior (Catania, 2013).

The independent variables

Consumer choice produces consequences which, in the behavioral perspective model, are classified as reinforcers (utilitarian or informational) and punishers (utilitarian or informational) (Foxall, 2007). Reinforcement, as a process, represents the consequences of consumer behavior that increase the probability of similar responses being repeated in the future. Utilitarian reinforcement is the tangible functional and economic benefits which stem from purchasing products, ownership and consumption. Informational reinforcement is a consequence of consumer behavior that is more likely to involve a lifestyle statement by which the consumer is reinforced by social attention or appreciation. Punishment, as a process, entails those consequences of consumer behavior that reduce the probability of similar responses being repeated in the future. Utilitarian punishments are the cost of consuming: relinquishing money; time-consuming registration before payment; forgoing alternative products; and so forth. Informational punishment is an aversive consequence of consumer behavior mediated by the social network. The key independent variable incorporated in the behavioral perspective model related to the consequences of consumer behavior is thus reinforcement (utilitarian or informational) and punishment (utilitarian or informational).

Shopping and consumption produces consequences which consist in reinforcement and punishment and, in this manner, the consumer acquires a learning history with respect to acts of this kind. For a consumer in a novel shopping situation, the neutral stimuli are transformed by this learning history into discriminative stimuli that signal the probable outcomes of a particular behavior in the setting by their intersection with the consumer's pertinent history of reinforcement (utilitarian and informational) and punishment (utilitarian and informational). It is this learning history that adds meaning to otherwise neutral-setting stimuli by investing them with the consequences of previous approach-avoidance behaviors in similar circumstances (Alhadeff, 1982). Therefore, the consumer behavior setting scope is the extent to which the current consumer behavior setting compels a particular pattern of behavior (for example, shopping online requires that the consumer must log on to the web, find the web shop, select products, put them in the shopping basket, and go through the confirm-order procedure). The consumer behavior setting consists of the current discriminative stimuli that signal reinforcement and punishment contingent upon the process of a purchase or consumption response. These settings of consumer behavior comprise the stimuli that form the social and physical environment (Barker, 1968). Stimuli that compose the consumer behavior setting may be: (1) physical (e.g., point-of-purchase promotion, store brand), (2) social (e.g., the salesperson, other customers in the shop), (3) temporal (e.g., opening hours, festivals like Halloween) or (4) regulatory (e.g., self- and other-rules that specify contingencies) (Foxall, 2005). The consumer's learning history is, in the behavioral perspective model, manifested within a particular behavior setting: prior learning establishes what will act as a discriminative stimulus in that setting by embodying the consequences, reinforcing and punishing, of earlier behavior in the presence of the relevant setting elements. So, if for example previous shopping online has produced consequences such as economic fraud, the consumer will probably establish a rule that the Internet is not a safe place to shop.

The central explanatory component of the behavioral perspective model is the consumer situation, represented by the interaction of learning history and the current consumer behavior setting which exerts a direct influence on the shaping and maintenance of consumer behavior

in specified surroundings (Foxall, 2007). The consumer situation is more specific than a setting: the consumer situation is defined and circumscribed not only by the consumer setting variables that signal utilitarian and informational consequences of behavior, but also by the salience of those discriminative stimuli as determined by the consumer's learning history. Thus, the consumer behavior setting, learning history and consumer situation are antecedents that function as independent variables in the behavioral perspective model.

Behavioral and social scientific research can be categorized into four major areas (Kerlinger & Lee, 2000): laboratory experiments, field experiments, field studies and survey research. This categorization is based on the assumption that there is a distinction between experimental and non-experimental research, and a distinction between laboratory and field research. The following section gives a presentation of laboratory experiments and field experiments in consumer behavior analysis.

Laboratory experiments

According to Kerlinger and Lee (2000), a laboratory experiment is “a research study in which the variance of all, or nearly all, of the possible influential independent variables not pertinent to the immediate problem of the investigation is kept at a minimum” (p. 579). A typical consumer behavior laboratory experiment aims to analyze the behavior–environment relationships. The experimenter can isolate the consumer situation from life outside the laboratory by eliminating the many extraneous influences that may affect antecedents and consequences (the independent variables) and consumer behavior (the dependent variable).

Several studies within consumer behavior analysis have investigated consumer brand preferences. For example, studies based on supermarket till receipts for weekly grocery shopping (Foxall & James, 2002, 2003) and studies based on panel data for fast-moving consumer goods (Foxall et al., 2004; Foxall & Schrezenmaier, 2003) have accumulated comprehensive knowledge about consumers' preference. However, due to the use of aggregated data, these studies do not acquire data about how individual consumer purchase patterns are developed, as requested by Hennig-Thurau and Klee (1997).

One way to study individual consumers' preferences toward a brand is to arrange different reinforcement contingencies for two or more choices in the laboratory (Fagerstrøm et al., 2011). Reinforcers can be organized according to different arrangements in which responses in a class that are followed by reinforcers are specified, i.e., schedules of reinforcement. Such arrangements can either be continuous or intermittent. Every correct response in a class is reinforced on a continuous reinforcement schedule, while on intermittent reinforcement schedules some of the responses in a class are reinforced. According to Catania (2013), there are four main types of simple schedules of reinforcement. These are arranged according to number of responses (R) or an interval plus a response (I) in combination if the interval or number is fixed (F) or variable (V). Hence, in fixed-interval (FI) schedules the interval remains constant from trial to trial, while in variable-interval (VI) schedules the interval varies from one reinforcement to the next. In fixed-ratio (FR) schedules the arrangement is that the number of responses required before reinforcement is constant from trial to trial, while in variable-ratio (VR) schedules the number of required responses changes. A number of studies have shown that VR schedules relatively produce the highest response rates and also that behavior maintained on such schedules is quite resistant to extinction. Extinction is the discontinuation of any reinforcement that once maintained a given response. Extinction, as a behavioral process, refers to a decline in the rate of response caused by withdrawal of reinforcement (e.g., Catania, 2013).

In a laboratory experiment by Fagerstrøm et al. (2011), the authors investigated to what extent manipulation of environmental contingencies could contribute to the understanding of

how consumer brand preferences develop. A laboratory experiment with two different schedules of reinforcement was arranged to study participants' choice in an online shopping context. Preference was studied by arranging different schedules of reinforcement simultaneously for two responses. When one of the alternatives was chosen more frequently than the others, it was denoted as a preference for an alternative source of reinforcement (Pierce & Cheney, 2004). Results from the experiment show that (Fagerstrøm et al., 2011) responses in nine out of 40 participants were not under the control of the experimenter-defined contingencies, one had an equal preference for the two alternatives and three participants showed color-sensitive behavior. For the remaining 27 participants, 18 showed preference according to the experimenter-defined contingencies (shop most frequently on the alternative with the highest number of programmed reinforcements), and nine were not under the control of experimenter-defined contingencies (shop most frequently on the alternative with the lowest number of programmed reinforcements). In general, the laboratory experiment by Fagerstrøm et al. (2011) found that 18 out of 27 participants showed preferences according to the experimenter-defined contingencies. In the first phase of the experiment, during the first part of training, it was observed there was more switching between the alternatives than later in the maintenance phase. In addition, choice time decreased as a function of the number of trials.

The laboratory experiment by Fagerstrøm et al. (2011) demonstrates that it is possible to study consumer preference on concurrent ratio schedules, where the researcher controls the reinforcement. The study expanded knowledge about consumer behavior when having a closed-setting experiment with control over reinforcement. Moreover, the study extended knowledge about how customer brand preference develops by studying environmental contingencies that shape and maintain consumer choices, and it represents one of only a few attempts to apply laboratory experimental analysis to understanding consumer preferences from observing individual behavior.

Another laboratory experiment by Fagerstrøm and Hantula (2013) investigated credit card use in a consumer choice setting. Building on the hyperbolic discounted utility model (see Green & Myerson, 2004), the study aimed to understand credit card use by students. Hyperbolic discounting is the tendency for people to increasingly choose a smaller-sooner reward (a temptation) over a larger-later reward as the delay occurs sooner rather than later in time. A simulated shopping experiment was prepared where 21 participants were asked whether they would save money for a new model of their favorite mobile phone brand, or buy the product on credit and get it immediately. The results showed (Fagerstrøm & Hantula, 2013) that the participants were willing to pay a high interest charge (nearly 40%) rather than waiting, saving money and purchasing the phone interest-free. However, these results were moderated by student experience with credit card purchases. Those who did not normally use a credit card did not opt to buy the phone immediately on credit, but preferred to delay purchase until the money was saved. These data demonstrate that in some cases, immediate availability of a much desired product such as a mobile phone may induce credit spending with extremely high interest rates.

Microworlds

Laboratory experiments, as a method for pursuing research, have pros and cons, as evidenced by the debate they have given rise to within behavioral and social scientific research. According to Brehmer and Dörner (1993), one could relate this discussion to the difficulties posed by complexity: the uncontrollable complexity of the field experiment creates problems of inference, while the controlled laboratory experiment may generate weak external validity. DiFonzo et al. (1998) contend that computer-simulated microworlds offer a solution to this dilemma.

The term “microworlds” appears to be used for the first time by Turkle (1984), who describes it as the carefully constructed, graphically rich and complex rule-governed worlds of video games. Further, within the field of decision-making studies, Brehmer (1992) and Brehmer and Dörner (1993) define microworlds as computer-generated simulation environments that participants interact with and that possess, to varying degrees, a dynamic, complex and opaque character. The ability to simulate dynamic decision systems using computer-simulated microworlds offers a level of experimental realism not often experienced in traditional laboratory research (DiClemente & Hantula, 2003; Hantula et al., 2008; Hantula & Bryant, 2005; Omodei & Wearing, 1995; Smith & Hantula, 2003). Furthermore, microworlds offer the researcher a high degree of experimental control, thus incorporating the benefits of experiments – effects due to experimental manipulation.

The consumer brand preference experiment by Fagerstrøm et al. (2011) can be categorized as a type of computer-simulated microworld study in which the dynamic aspect is only partly present. Based on a simulated shopping situation made in MediaLab, participants interact with the environment by browsing between two web shops and deciding which option to choose. MediaLab is software developed by Empirisoft for the creation of psychological experiments in a computer lab which makes possible multi-stimuli experiments and the recording of data on each individual participant. MediaLab made it possible to set up the experiment and automatically record data. Thus, microworlds bring useful features to consumer behavior analysts including realism and high levels of control, and MediaLab is software that can be used to administer the study.

Field experimentation

Marketing needs to have a theoretical and/or empirical foundation to account for the situational influence of the marketing mix on consumer choice. The matching law (Herrnstein, 1961, 1970) is a mainstream behavior analysis of choice behavior and has been studied for several decades (e.g., Baum, 2002; Davison & McCarthy, 1988). The matching law’s research history, indeed the history of the whole of behavior analysis, has mainly been conducted in a systematic experimental framework where knowledge is built by constantly putting more factors under experimental control. Most of the research has been done on animal behavior in the behavioral laboratory. The few experimental studies that have been conducted on human behavior have all been done in a rather closed setting.

The subject matter of consumer behavior analysis is also the exploration of the possibility of using the concepts and methods of behavior analysis applied in research, on a simpler level, for the study of consumer choice in open settings. As such, it studies the impact of important variables on consumer choice in natural situations. Some of these variables have already been identified from research on matching at a simpler level. To deal with the influences of the marketing mix on consumer choice, behavior analysis needs to find the sole effects of the most important variables to determine its importance in accounting for complex consumer behavior. The experimental method, where the effect of each independent variable is found to keep the others constant, is a necessary step in exploring the ability of behavior analysis to describe, predict and control consumer choice in open settings. This brings us to the open experimental question of the research program, which is important for both consumer marketing and behavior analysis: How can online and in-store behavioral experiments help to accumulate valid and reliable knowledge of the effects of marketing mix factors on consumers’ choices in natural and open settings?

This entails behavior analytical evaluations (see, e.g., Johnston & Pennypacker, 1993) and comparisons of the legitimacy of different outcomes from consumer choice and matching

analysis of sales data obtained with in-store experiments. The Consumer Behavior Analysis Research Program (e.g., Foxall & Sigurdsson, 2013) uses behavioral economics as a paradigm and explores the relevance of in-store (e.g., Sigurdsson et al., 2014) and online behavioral experiments (e.g., Sigurdsson et al., 2013) on such metrics as relative sales and matching analysis to the study of consumers' brand choice in natural open settings.

In-store experiments

The in-store experimental settings have consisted of different store types, such as convenience, supermarkets and discount stores. The research attempts to elucidate to what extent within-group in-store experiments, with relative responses and matching analysis, are relevant to consumer choice exploration. Different methods of data analysis are used on the sales data generated from the in-store experiments. This includes relative sales analysis and reinforcer-cost matching analysis (also known as relative demand analysis). The relative sales analysis has its predecessors in previous behavior analytical work in the concept of relative response rate (Herrnstein's dependent variable, e.g., 1961) and visual inspections of moment-to-moment changes in response rate (Skinner's dependent variable, e.g., 1974). In fact, relative sales analysis is a combination of these, as it represents momentary changes in relative sales of a particular target brand (analogous to the experimental key in the behavioral laboratory) as a function of particular environmental contingencies. It is considered important for the evaluation of different matching analyses to have an assessment of consumer choice (relative sales analysis) to make a comparison. The reinforcer-cost matching is mostly known from previous consumer behavior analysis research as relative demand analysis (see, e.g., Foxall & James, 2001, 2003; Foxall et al., 2004; Oliveira-Castro et al., 2005) but it is here represented within the framework of matching.

In sum, the in-store experiments have been designed to explore whether consumer choice and the substitutability of brands (matching) are affected by an experimental manipulation of important marketing mix factors such as *1 Place*, the placement of brands in store layouts (Sigurdsson et al., 2011b), *2 Price*, pricing of fast-moving consumer goods or brands (Sigurdsson et al., 2011a), and *3 Promotion*, in-store advertisements of a brand's benefits (Sigurdsson et al., 2010).

In-store experimental methodology

The program is a methodological exploration of the relevance of in-store behavioral experiments. It is part of the consumer behavior analysis agenda of investigating the relevance of behavioral economics in the context of marketing. It studies how important marketing factors affect consumer choice in complex, real, affluent and competitive retail environments. More precisely, traditional marketing mix factors are manipulated to explore their effects on consumers' buying behavior. The main question is to what extent the behavior analytical methodology can answer what effects certain periodical changes in such factors as Place, Price and Promotion have on consumers' buying behavior in the natural environment.

Similarities and deviations from characteristic behavior analysis

Behavior analysis is built on the method of single-subject experimental designs, where the term "single" refers to the experimental comparison but not the few subjects generally used (e.g., Perone, 1991). According to Johnston and Pennypacker (1993): "[an] experiment is a series of

actions that result in a set of special observations that would not otherwise have been possible” (p. 8). The main purpose of an experimental design is to avoid threats to internal validity by trying to exclude the effects of other variables under study on the dependent variable. This is ideally done by controlling both the variables under study (the independent variables) and other important variables (extraneous variables) thought to affect the dependent variable and make the effects of the independent variables unclear. This allows the researcher to examine what effects different conditions have on behavior. Without the ability to intervene, behavioral control is bound to be based on speculations.

When evaluating the behavioral perspective of consumer behavior research, and marketing in general, it is important to understand how much effect, or control, of consumer behavior can be attributed to the environment. Experiments are the best way to explore this. But unlike the laboratory experimenter, who can control most or all important variables in the laboratory – like deprivation, reinforcement schedules etc. – the field experimenter studying consumer choices unfortunately does not have that option; studying, as he/she does, consumer behavior in natural settings. There are both strengths and weaknesses in experimental work in consumer behavior analysis. This is because external validity and the analogous interpretations, built on the findings, are much more related to the actual reality than interpretations built on experimental findings with lower animals as subjects, without wanting to diminish their value. We here propose, in line with the Behavior Perspective Model, a continuum of open to closed settings, where the aim for consumer behavior analysis is to have the most control possible in open natural settings (Figure 2.2). This shows how the research, listed here, tries to apply experimental control to study consumer behavior in open settings, within the framework of matching theory.

This research tries to retain the rigorous methods and concepts used and developed in the behavioral laboratory, but obviously this can be hard to attain. It is important to be patient in the search for greater control over consumer behavior, as there are many stepping stones. Table 2.1 shows, in a simplified manner, how this study differs in an important way from general laboratory research in behavior analysis, in that it shares some familiarity to experimental work in general psychology and related disciplines.

Table 2.1 compares the experimental analysis of behavior with more traditional experimental psychology. The bold items best correspond to this research. The in-store experiments have many participants, consisting of the consumers in the stores during the experiments. The research uses within-subject experimental design, to the extent that the consumers (in each store) can be looked at as a group. The main point is that the experimental comparison is made within each store’s consumer group, but not with some other independent group (between-group comparison). The study uses direct, repeated measures of consumer choice behavior

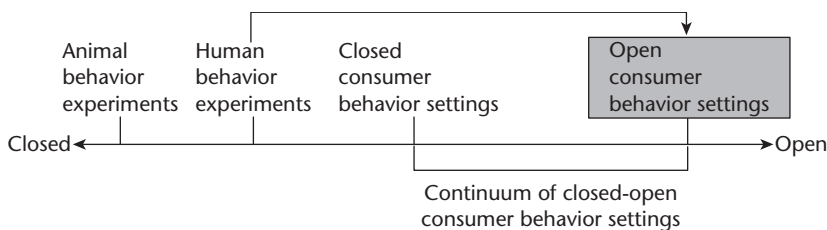


Figure 2.2 Continuum of consumer behavior settings and the transfer of experimental control from closed to open environments

Source: Adapted from Foxall (1993)

Table 2.1 A comparison of behavior analytical and traditional experimental psychology research

<i>Dimension</i>	<i>Experimental analysis of behavior</i>	<i>Traditional experimental psychology</i>
Number of subjects	Few	Many
Research design	Within-subject	Between-subjects
Data collection	Direct, repeated measures of behavior	Various methods, often indirect and nonrepeated measures of behavior
Data analysis	Graphic	Statistical
Approach to variable data	Consider the variability as imposed; isolate and control the responsible extraneous variables	Consider the variability as intrinsic; use statistics to detect effects of the independent variable despite the variability

Source: Adapted from Poling et al. (1995)

(e.g., relative sales). This is different from dividing a large number of subjects into two groups, experimental and control groups, where the behavior of the two groups is generally compared using the rules of inferential statistics (Johnston & Pennypacker, 1993).

Regarding analysis of data, the results are presented in graphic form showing consumers' choices during the baseline and interventions for each store. The data are not entered into a database for the ease of an inferential statistical analysis; nor for data from each experiment (e.g., the Price experiment) or for the same types of stores (e.g., budget stores), as would be expected from a social science perspective. This is an exploration of the relevance of behavior analysis, as represented in the work of, e.g., Skinner (1938) and Herrnstein (1961, 1970, 1997), and their followers (e.g., Sidman, 1960). As characteristic for behavioral analytical research, the results present descriptive statistics such as measures of central tendency, variation and association (e.g., mean, range and regressions with slope and intercept) but no inferential statistics (for the pros and cons of the use of inferential statistics in behavior analysis, see an introduction to six articles in Baron (1999); see also Hopkins et al. (1998)). Instead, visual inspections are used to interpret whether there is a difference between conditions (see a critical discussion of this approach in Fisch, 1998). It is important to remember that although the dissertation puts behavior analysis forward in the realm of consumer behavior research, it is first and foremost a critical exploration of the behavioral perspective (matching), and those methods advocated by the behavioral research community (e.g., visual inspections, repeated measures, behavioral control). As such, in this case, these factors are tested (like visual inspections) but others, although being worthy of exploration (especially inferential statistics), are omitted.

Field experiments rely on experimental techniques by controlling important extraneous variables, such as the prices of the competing brands, extra line-ups and other stimuli in the stores. This is obviously a field experiment, meaning that it is impossible to control the environment in the way done in the closed setting of the behavioral laboratory. However, this study deals with the behavior to be interpreted: real consumer behavior in the modern marketing system.

Group analysis

Traditionally, behavior analysis has emphasized the study of individual organisms; analyzing the interrelationship between a behaving organism and its environment. The field owes much of its success to the individual behavior approach since it, among other things, reduces behavioral variability when compared to studying groups. Strictly speaking, "Behavior is a biological

function of organisms, and a group is not an organism” (Johnston & Pennypacker, 1993, p. 81). Lots of valuable information is lost (e.g., individual patterns of behavior) when researchers study only the behavior of a number of people. When data are put together, it can hide functional relationships. That can also be asserted whenever data are grouped or aggregated, as is done in matching analysis and all molar accounts – a conduct of primary interest to behavior analysts at least since the 1970s. It is important to allow different kinds of behavior analysis – molar, molecular, mathematical orientation or experiments – and to study their strengths and weaknesses. Each has something to offer, keeping the constraints in mind. For instance, it is necessary to study group behavior to interpret convincingly the third level (group behavior – culture) of selection by consequences (genes – individual behavior – culture) (e.g., Glenn, 1988; Skinner, 1984).

Studying individuals is not always achievable or of primary interest. In marketing, individual behavior is important, but for an applied discipline the subject matter is often groups (e.g., segments of consumers), because individuals will not make fast-moving consumer brands successful. Only large numbers of people buying the brand will make it thrive in terms of revenue. Researchers or marketers want to know what functions stimuli have for consumer choices. In consumer behavior analysis this has been done on the basis of observational data (Foxall et al., 2006):

When dealing with consumer behavior, however, research and managerial interests frequently lie in identifying what functions as reinforcement to large groups of people and, in the large majority of cases, this has to be done on the basis of observational, rather than experimental data. This may increase some already existing ambiguities in defining different types of reinforcement.

(pp. 105–6)

The Consumer Behavior Analysis Research Group, based at Cardiff University, has built an essential research methodology to study consumers’ choices, both at the individual and group level of analysis (for a review, see Foxall et al., 2007). This research has established the molar law of effect (the matching law) in the realm of consumer behavior with “correlation between output and feedback” (Baum, 1973, p. 141), for instance in the form of the relative amount paid for and the relative amount of a brand received. The correlational methodology is important as in many cases there will be no experimental control available to the consumer behavior analyst. However, in some cases, as here, control will be available in the form of interventions. The consumer researchers will be able to perform macro contingencies, defined as “individual contingencies applied directly to a large number of people” (Branch, 2006, p. 6). This can give the researcher better grounding for functional relationships, which is important when there is an interest in extending the successful use of behavior analysis to the social sciences (like marketing).

Group choice behavior (where individual behavior is also examined) has been studied with matching analysis. Its results show that group behavior by no means mirrors individual choices. Baum and Kraft (1998) state that “results at the level of the flock in no way paralleled behavior at the level of the individual” (p. 227). They present a generalized matching equation for group behavior (Equation 1):

$$\log \frac{N_1}{N_2} = a \log \frac{r_1}{r_2} + \log c \quad (1)$$

predicting that group choice, number of predators (N), matches obtained resources (r) (Baum & Kraft, 1998). It is possible to transfer this to consumer matching where the number of predators can be seen as analogs to the amount paid, and obtained resources as similar to the number of brands. In a later publication, these authors (Kraft & Baum, 2001) also state that “experiments demonstrate that an IFD analysis [equivalent to matching analysis] of group choice is possible and useful”. This strengthens the foundation for matching analysis conducted on choice data from large groups of consumers (see Curry et al., 2010).

Applications: an example

Research in marketing has shown that most consumers want to increase their consumption of so-called healthy food and decrease their unhealthy choices. In line with this, and the fact that most retail purchase decisions are made in the store, prior research has tested in-store applied behavior analysis of both kinds of products (how to increase healthy consumption and decrease unhealthy selections). Research shows that the retail environment is among the diverse barriers to an increased consumption of healthy food products, and it includes factors such as how healthy food products are located within the stores compared with the positioning of unhealthy food products (e.g. sweets), availability, nutrition information and price. It is also common knowledge that in-store shelf placement of sweets and products with high glycemic carbohydrates are most commonly situated in highly visible areas, and sweets are almost always situated at the checkout. Hence, owing to the critical importance of exposure, more emphasis should be placed on maximizing accidental exposure to more healthy food products in the retail environment along with more active promotion of such products. Sigurdsson et al. (2009) conducted an in-store experiment measuring the effects of product placement (highest, middle, lowest shelf and an extra line-up) on consumers’ purchases of an international potato chips brand. The results showed that placement of potato chips on the middle shelf was associated with a higher percentage of purchases compared with the lowest and highest shelf. Also, an extra line-up of the potato chips at the store entrance almost doubled its market share. Sigurdsson et al. (2011b) also performed an in-store experiment which consisted of such interventions as placing bananas at the checkout and promotion. An interesting point from a consumer survey that followed the in-store experiment was that consumers had very positive attitudes toward healthy food products (especially bananas) and intended to buy more. In-store interventions, like the one performed, were also deemed to be important and necessary by most consumers in the survey. Despite this, the results from the in-store experiment deviated substantially from the outcome of the survey, such that it was unsuccessful in changing consumers’ buying behavior of bananas in the stores. Furthermore, another in-store experiment has shown that those who already buy bananas do so no matter what the price is and therefore lowering the price is not enough to increase the sales of bananas (Sigurdsson et al., 2011a). It seems likely buying (or not buying) a fruit like bananas is very habitual, and that the attitudes are more “favorable” than the ratio of buying suggests.

The inconsistency between consumers’ stated intentions and actual buying behavior facilitates better understanding of the marketing problem at hand. It is dangerous for retailers to rely simply on customers’ verbal behavior (e.g. complaints, pressure and survey results). The personal account is important but good practice in marketing research encourages the firm to take decisions based on different sources. Finally, Sigurdsson et al. (2014) examined both the immediate and enduring effects of modifying the typical in-store shelf placement of food items at the checkout, with or without an in-store advertisement, on consumer behavior. Instead of unhealthy items (e.g., candy, high glycemic carbohydrate), healthier items were rotated to the

checkout lines in different types of stores. The researchers examined the effects of shelf placement at the checkout (Place) and in-store advertisement (Promotion) in relation to consumer buying behavior of the healthy products such as dried fish and fruit mix. The effects of these interventions on buying behavior of the moved “unhealthy” products were also assessed. The results demonstrate that placing healthy food items at the checkout (prominent discriminative stimuli) in stores can lead to a substantial impact on sales of these products. The in-store experimentation was able to identify healthy food items (e.g., dried fish or nuts) that have the potential to increase their sales about 400–500% if placed at pivotal places within the store. These levels of sales were, however, not maintained during withdrawal conditions or during the follow-up stage (return to baseline). Adding an advertisement at the point of purchase also did not lead to a meaningful generalizable increase in sales beyond the results obtained from stacking these products at the checkout. One explanation for the apparent success of dried fish, fruit mix and nuts may be related to the low conservation rate and the small package sizes of the target products selected for the experiment. It is therefore often more sensible to examine the databases (e.g. looking for low conversion rates for healthy food items) rather than consumers (verbal reports).

Summing up

The experimental analysis of consumer choices tends to reveal quite clearly that many marketing interventions that sound sensible will be unsuccessful. It would, however, be a mistake to rely solely on information from experimentation or databases – to dismiss the personal account. Such measures can help identify where the marketing problem lies. The description of consumer behavior, as well as prediction and influence, needs the alignment of the personal level of the consumer to contextual behavioral experimentation. The consumer behavior analytical experiments conducted have also revealed a surprising inability of pricing to affect sales of all kinds of fast-moving consumer goods (e.g., Sigurdsson et al., 2011a). This finding can be generalized between different types of stores (convenience vs. discount) as for other studies conducted. Pricing is often inefficient in changing sales in different types of stores, and if there is any change it can be that higher pricing generates more sales. For example, in one of the studies conducted at Co-op (our main collaborator), the highest sales of cherry tomatoes were when the price in one of the discount stores was 17.46 NOK (the Norwegian currency) compared with 9.56 NOK. This is around 83% higher pricing, giving a gross margin of close to five times higher. Understandably, results like this have significant meaning for the retailer and are also of interest for consumer protection.

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