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The Behavioral Economics of Brand Choice

Gordon R. Foxall, Jorge M. Oliveira-Castro, Victoria K. James and Teresa C. Schrezenmaier

The Behavioral Economics of Brand Choice

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This is for

David (VKJ)
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Preface

The central intellectual problem of academic marketing is the explanation of consumer choice at the level of the brand. A brand is any version of a product or commodity that competes in the market place with other such versions: it may be a variety of a product, supermarket, or person, or of a place, ideology or creed. By and large, marketing inquiry has been confined to the first three. But, however broad or narrow our definitions of it, the brand uniquely defines the marketing level of analysis, one in which members of other academic communities show little if any direct interest. It is marketing's response to the need to explain consumer brand choice that will ultimately determine its success as a legitimate domain of academic inquiry.

Understanding consumer brand choice is, therefore, central to modern marketing thought and practice. Successful marketing management inheres in the accurate anticipation of consumer behavior by means of the marketing mix, while academic marketing as a separate subject matter is defined largely in terms of the intellectual explanation of brand choice and marketing response. A great deal is known about the patterns of brand choice exhibited by consumers of fast-moving products such as foods. The work of Ehrenberg and his colleagues is of paramount importance in this regard. But while marketing texts are not short on prescriptions for marketing action based on surmises about the behavior of consumers, there is a singular lack of understanding of the underlying causes of brand choice won by painstaking empirical investigation of consumer markets of the kind Ehrenberg has produced at the purely descriptive level. Consumer research requires novel insights into the dynamics of consumer market structure and this book reports on a research program that has sought and found such insights in the field of behavioral economics.

The particular source of behavioral economics on which we draw has its origins in behavioral psychology and experimental economics where it has proved highly successful in predicting the behavior of animals and humans according to the principles of basic economic analysis. For the first time we have extended this methodology to cope with the complexities of consumer purchase behavior in national markets. Our work has three purposes:

- To demonstrate that the methodology of behavioral economics can be meaningfully applied to the analysis of consumer choice; this has meant showing that the full complexity of the marketing-oriented economy can be incorporated in the analysis, so that the influences of both price and non-price elements of the marketing mix on consumer behavior can be understood in terms of the basic behavioral economic theory;
- To advance academic consumer research by using the insights of our findings to the causal analysis of brand choice, and thereby to extend understanding of consumer choice in marketing economies in ways that the purely descriptive approach has not achieved;
- To draw conclusions for marketing practice.

In general, our empirical work has been marked by two phases: an ad hoc analysis of a convenience sample of consumers in order to demonstrate that the principles of behavioral economics actually apply to consumer choice analysis, and a study based on consumer panel data for 80 consumers for weekly purchases of eight product categories over a period of 16 weeks. In the course of the research program on which the book is founded, the authors have published extensively in refereed marketing and psychology journals and will draw on these sources as well as adding entirely new material.

The early chapters (particularly Chapters 1 and 2) present a detailed account of the form that consumer choice takes in advanced marketing-led economies and compares our empirical knowledge of these affairs with the prescriptions for marketing action put forward in marketing managerial texts. Drawing particularly on the work of Andrew Ehrenberg and his colleagues, it describes patterns of consumer choice in terms of such concepts as frequency of purchase, penetration level, duplication of purchases, and double jeopardy, and relates the findings of research on consumer choice to the limited scope that marketing managers have to influence brand selection other than by means of short-term price promotions. Attention is drawn to the restrictions placed on consumer research by a purely descriptive approach and the consequent need to seek appropriate conceptual and methodological insights from the social sciences.

Behavioral economics is presented as a methodology that promises considerable theoretical and practical avenues for the advancement of consumer research. Specifically, it brings to the analysis of consumer choice a set of proven techniques and theories for the analysis of repetitive behavior such as brand purchasing which systematically relates market choices to the economic variables that control them. The investigation and explanation of animals' economic behavior which has been the major – but not the sole – focus of this work raises fascinating theoretical and philosophical questions for marketing science such as the role of cognition in choice. As a result, our research program is not confined to a search for managerial advantage but examines continuing issues in the social sciences. This part therefore describes the technical and methodological implications of matching theory, maximization theory, economic analysis and marketing science as a prelude both to our empirical research findings and their implications for consumer research and marketing practice, and to our subsequent conclusions with respect to the nature and explanation of choice.

Chapters 3, 4, 5 and 10 are concerned with the establishment of a new methodology of consumer analysis. Although the behavioral economics paradigm described above provides a sound starting point for the deeper understanding and explanation of patterns of brand purchasing, it is limited by its having investigated situations of choice that lack in some respects clear analogues of the realities of the marketing economy. These include competition, exchange, and the influences on brand selection of the non-price elements of the marketing mix such as advertising. The positive implications of a technique of behavior analysis known as matching theory are discussed, together with the search for a viable explanation of the behavioral equilibrium to which matching leads in situations of choice. Such explanations include maximization (which is discussed in some detail relative to its importance in economic theory and marketing science) and melioration in which the consumer selects the local choice alternative that provides the higher or highest return rather than maximizing globally. Melioration is discussed in relation to diminishing marginal returns to economic behavior, satisficing, and incremental maximization.

Having set the theoretical scene, we turn to our first researches that showed the relevance of matching to consumer brand choice, describing how the methods of behavioral economics need to be adapted if they are to provide realistic means of analyzing consumer choice in competitive markets. Our first studies of matching among individual consumers, followed by work with a larger sample of brand purchasers within the matching framework, and on deviations from the matching law are all described here. In addition, we seek a broader understanding of the patterns of choice unearthed in this way by reference to the literature on foraging and behavioral ecology. These chapters also act as a prelude to the later work on behavioral economics of consumer choice by describing our studies of consumer brand choice in terms of relative demand analysis and maximization analysis, and conclusions are drawn with respect to the competing explanations of consumer choice put forward by economics and marketing science.

The methods of analysis derived from behavioral economics are also extended by introducing a marketing model of consumer choice, the Behavioral Perspective Model (BPM), which explains consumer behavior by reference to the utilitarian and symbolic rewards that products and brands confer on their purchasers. This model permits a powerful account of consumer brand choice as behavior shaped by the promotional/advertising influences available to marketing managers as well as price differentials.

Chapters 6, 7, 8 and 9 describe our further analyses of brand choice based on behavioral economics, extending the scope of the study by considering how groups of consumers, defined by their propensity to choose different patterns of utilitarian and symbolic reward show distinct susceptibilities to price differentials among brands. The question what consumers maximize can now be answered in terms of these discrete combinations of customer benefit identified by the BPM.

Moreover, since buyers of consumer non-durables tend to buy several brands of a product category in the course of a year, though a few are exclusive buyers of particular brands, we investigated the dynamics of successive repeat-buying and penetration levels of groups of brands belonging to similar levels of brand differentiation (defined in BPM-derived terms of utilitarian and symbolic customer benefit). We specifically examined the probability of consumers' buying brands belonging to the same level of differentiation on successive shopping occasions. Since the number of exclusive buyers of a brand decreases as the duration of sales increases, we hypothesized a decrease in the probability of sequential repeat-buying of brands belonging to the same level of brand differentiation with increases in the number of successive shopping occasions. Similar analysis was undertaken to examine the penetration level of groups of similar brands, which were expected to increase with the period chosen for analysis. Two equations, constructed to describe the dynamics of repeat-buying for groups of brands, were applied to the description of the dynamics of repeat-buying and penetration level of particular brands. The results suggest several managerial applications including the estimation of the proportion of sequential repeat buyers and non-repeat buyers during the product shopping cycle.

An additional dimension to the study of consumer brand choice stems from the disaggregation of overall price elasticity of demand. Several marketing strategies depend upon knowledge of consumers' responsiveness to changes in price. Studies that have decomposed price elasticity suggest that the major impact of promotions is on brand switching rather than increased consumption. Some of these results also indicate that consumers tend to buy smaller quantities of more expensive brands when compared to cheaper ones (i.e., inter-brand elasticity). Our research attempted to verify whether such inter-brand elasticities occur and to measure the relative importance of intra- and inter-brand elasticities in determining overall category elasticity. Brands were classified according to the level of programmed informational (i.e., socially mediated) and utilitarian (i.e., mediated by the product) reinforcement, proposed by the BPM. This classification was used to calculate inter-brand elasticities. Regression analyses indicated that, for most product categories, intra-brand elasticity was higher than utilitarian inter-brand elasticity, which, in turn, was higher than informational inter-brand elasticity. These results suggest that overall category elasticity observed for supermarket products reflects different choice patterns: buying larger quantities of a promoted brand and buying smaller quantities of more differentiated, usually more expensive, brands.

Finally in this part of the research, we considered individual consumers and the possibility that inter- and intra-consumer levels of price elasticity could be identified. Following the behavior-analytic tradition of analyzing individual behavior, we investigated demand elasticity of individual consumers purchasing supermarket products, and compared individual and group analyses of elasticity. Elasticity coefficients were calculated for individual consumers with data from all or only one product category (intra-consumer elasticities), and for each product category using all data points from all consumers (overall product elasticity) or one average data point per consumer (inter-consumer elasticity). In addition to this, split-sample elasticity coefficients were obtained for each individual. The results suggest that: (1) Demand elasticity coefficients calculated for individual consumers purchasing supermarket food products are compatible with predictions from economic theory and behavioral economics; (2) Overall product elasticities, typically employed in marketing and econometric research, include effects of inter-consumer and intra-consumer elasticities; (3)

When comparing demand elasticities of different product categories, group and individual analyses yield similar trends; and (4) Individual differences in demand elasticity are relatively consistent across time, but do not seem to be consistent across products. These results demonstrate the theoretical, methodological and managerial relevance of investigating the behavior of individual consumers.

Overall the volume establishes that utilitarian and informational reinforcement, derived from the BPM, can serve as a basis to elucidate consumer brand choice with respect to both sources of benefits. In the course of this, we have suggested a refined concept of substitutability, which seeks the reason for substitutability in price and in non-price marketing factors, i.e., utilitarian and informational reinforcement. Thus, our analyses suggest that demand for substitute goods is not only price-related but can also be related to informational, more symbolic, benefits. First, the matching analysis confirmed that brands within a product class are functionally substitutable. Second, it has been demonstrated that brand choice of frequently-bought supermarket goods reflects, via consumers' responses to price differentials, their preferences for combinations of utilitarian and informational reinforcement. Third, the analysis has shown that consumers tend to choose brands within the same or the adjacent price tier as these are reflected by different combinations of utilitarian and informational benefits.

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1

Brand Choice in Behavioral Perspective[1]

Gordon R. Foxall, Jorge M. Oliveira-Castro, Victoria K. James and Teresa C. Schrezenmaier

The study of consumer behavior has been given increasing attention in the context of the expansion of the study of marketing and marketing research over the past decades (e.g., Kotler *et al.*, 2001; Jobber, 2004; Keith, 1960). Today, consumer researchers account for almost half of all marketing faculty in business schools (Simonson *et al.*, 2001) and it is a growing area of research in other disciplines such as sociology, communication and anthropology (e.g., Miller, 1995). One of the reasons for the interest in the subject has been that markets and companies have been growing in size and hence there is no longer a great deal of proximity between sellers and buyers. Whereas selling for the most basic commodities like food used to be an everyday social experience, it largely has become an anonymous process with minimal personal interaction, possibly even without any face to face contact when shopping over the Internet. Most purchases for food items and other products, at least in urbanized areas, are done in supermarkets where there is little interaction between staff and customers.

However, despite the rapid growth and development in the study of consumer behavior, there are considerable disagreements about what consumer research is, what its objectives are, and how it differs from other disciplines (Simonson *et al.*, 2001). Consequently, the field lacks a universally-accepted theoretical framework or model (Foxall, 2005). The disciplines of economics and psychology (especially cognitive and social) have traditionally provided the theoretical foundations of consumer behavior and have bent their research toward more cognitive approaches (Jacoby *et al.*, 1998). Although several theoretical approaches have influenced consumer research, such as behaviorism, physiological psychology, psychoanalytic psychology, cognitive psychology and interpretative psychology (*cf.* O'Shaughnessy, 1992), social-cognitive theories and models have dominated the field with an increasing emphasis on cognition (e.g., decision making) rather than on social phenomena (e.g., reference groups) (*cf.* Simonson *et al.*, 2001). Hence, many consumer choice models portray consumer behavior as a process where thinking, evaluating and deciding are prevailing (e.g., Engel *et al.*, 1995; Howard & Sheth, 1969). Although the importance of emotions in buying behavior has also received a growing share of attention in recent years (e.g., O'Shaughnessy & O'Shaughnessy, 2002; Bitner, 1992; Dawson *et al.*, 1990; Donovan & Rossiter, 1982), the large majority of studies are designed to investigate consumer decision-making processes, inspired by cognitive, information processing, theories (see Jacoby *et al.*, 1998; Simonson *et al.*, 2001, for comprehensive reviews).

As an example, it has been widely assumed that measuring attitudes and beliefs will enable marketers to predict consumers' behavior. The Theory of Reasoned Action (Ajzen & Fishbein, 1980) and the Theory of Planned Behavior (Ajzen, 1985) have been very influential in this respect and have been used extensively to demonstrate the link between attitudes and action. According to these theories, psychological constructs, such as attitudes and beliefs, which are formed through direct or indirect experience with the attitude object (e.g., a product's attribute), would influence the person's intention to act in relation to the object, which in turn would influence the person's behavior (e.g., buying the product). Such constructs (e.g., attitudes) have been usually measured on the basis of consumers' responses to questionnaires, the results of which are then used to predict consumers' behavior toward the object (e.g., purchasing). However, it has been repeatedly pointed out by scholars that this relationship is in fact much weaker than assumed (e.g., Wicker, 1969; Foxall, 1987). Although such criticisms had some impact on the adoption of these theories, which has declined in use since (Simonson *et al.*, 2001), the most commonly adopted solution to these weak relations between attitude and behavior were to amend slightly the theory or the methodology. One way of doing this was to propose, for example, dual-process theories, according to which consistent relations between attitude and behavior need not always occur for they would depend on other factors, such as level of consumer's involvement (e.g., Chaiken, 1980; Petty & Cacioppo, 1983) or level of correspondence between measures of attitude and measures of behavior (e.g., Kraus, 1995). Since then an enormous number of studies have attempted to identify the variables that influence attitude-behavior consistency, which do not propose any substantial change in the basic theoretical and conceptual framework of the research and, consequently, multiply the number of psychological constructs related to the phenomena of interest (*cf.* Glasman & Albarracín, 2006). Considering that the field is very akin to marketing where prediction of what consumers will do is of paramount importance, empirical results showing inconsistency between attitudes and behavior may discourage the adoption of cognitive models to explain consumer behavior, or, at least, encourage the search for alternative types of explanation. In fact, a closer examination of the development of this tradition of research indicates that when more emphasis is given to possible effects of situational variables and to measures of behavior, the level of prediction of behavior increases substantially (*cf.* Foxall, 1997). These findings suggest that approaches of consumer behavior that give more emphasis to situational variables and behavioral measures might be promising alternatives to the prevailing cognitive theories.

There is yet another reason to look for epistemologically different approaches of consumer behavior, namely, the excessive dominance of the social-cognitive way of theorizing. According to some epistemologists, scientific development of a field depends on diversity of ideas, on opposing, incompatible views strongly held by different research groups. According to this position, the overwhelming predominance of one single theoretical perspective may impoverish the intellectual milieu and hinder scientific development of the field (*cf.* Feyerabend, 1993; for more details of these ideas applied to consumer behavior and marketing, see Foxall, 1997).

Consumer behavior analysis

An alternative approach to consumer behavior that emphasizes the influence of situational variables and direct measures of behavior might be found in behavioral psychology, particularly in Skinner's operant theory (*cf.* Skinner, 1953, 1969, 1974). Behavior analysis, as this field is usually known, has developed a coherent and systematic set of theoretical concepts, derived from a long tradition of experimental and applied research. It has always emphasized the role of situational variables in the determination of behavior, paying particular attention to events that antecede and follow individuals' responding, and defended the adoption of direct measures of behavior, with little use of hypothetical constructs in their theories. One of the central concepts in operant theory is the three-term contingency (S^D – R – S^R), which specifies what responses (R) are reinforced (S^R) or punished in the presence of what situations or discriminative stimuli (S^D). According to the three-term contingency, reinforcing and punishing consequences of responding increase and decrease, respectively, its future occurrence probability in similar situations. Events in the situation would acquire discriminative (or inhibiting) functions by signaling the probability and magnitude of reinforcement that would be contingent upon the emission of a given response. This conceptual framework has been used to analyze and interpret a very broad range of phenomena, including, for example, learning, verbal behavior, clinical interventions, politics, and religion (e.g., Skinner, 1953, 1957). Behavior analysis has also developed a strong tradition of experimental research on choice and consumption that could enrich the investigation of consumer behavior. The field has developed systematic theoretical treatments of choice and consumption, based on results from laboratory experiments and institutional interventions, such as the matching law (Herrnstein, 1970) and laboratory analysis of demand (Hursh, 1984), which are now part of the interdisciplinary area usually known as *behavioral economics*.

Despite the fact that behavior analysis has been heavily criticized since the cognitive revolution entered its ascendancy from the 1960s onwards, the characteristics mentioned above would in themselves justify the exploration of its usefulness in the field of consumer behavior. Moreover, recent research developments in behavior analysis have addressed some of the most common criticisms directed to it. Behavior analysis was much criticized for its excessive use of animal experiments to the exclusion of investigating complex, typically human phenomena. In the last decades behavior analysis has come to treat subject areas that lie at the very heart of cognitive psychology, among them thinking, decision making and language. The distinction between behavior that is simply the result of the individual's direct contact with the environment ("contingency-shaped" behavior) and that which is the result of verbal interventions from others or from the individual him/herself ("rule-governed" behavior) is particularly relevant here. The advent of investigations of stimulus equivalence, and naming, to give two examples, have transformed behavior analysis from a school of psychology that was once easily disparaged to an exciting intellectual and practical exploration of human complexity.

In order to integrate consumer research with behavioral principles, Foxall (1990, 1997) developed a model which has, since its emergence, proved a useful framework: the Behavioral Perspective Model (BPM). Foxall (2002, p. 20) argues that the BPM is a "means of summarizing empirical regularities", in the same way as Skinner has been fundamentally inductive in their approach. Foxall (1998, p. 337) summarizes the model as portraying "the rate at which consumer behaviors take place as a function of the relative openness of the setting in which they occur and the informational and utilitarian reinforcement available or promised by the setting". These components of the model are explained in what follows.

The BPM represents an adaptation of the three-term contingency and locates consumer behavior at the intersection of the consumer's learning history and the current behavior setting, that is, at the consumer situation. Thus, the BPM provides an environmental perspective to consumer behavior and hence includes situational influences in the analysis of purchase and consumption. In behavioral terms, consumer behavior, the dependent variable, is a function of the individual's learning history related to a given type of consumption, the behavior setting and the consequences the behavior produces. Figure 1.1 combines all these variables to provide a general picture of the BPM.

The behavior setting is defined as the social and physical environment in which the consumer is exposed to stimuli signaling a choice situation. A doctor surgery's waiting area, a supermarket or an open-air festival in a public park are all examples of behavior settings, varying in their scope and capacity of evoking consumer responses. This scope translates into a continuum between an open and a closed setting,

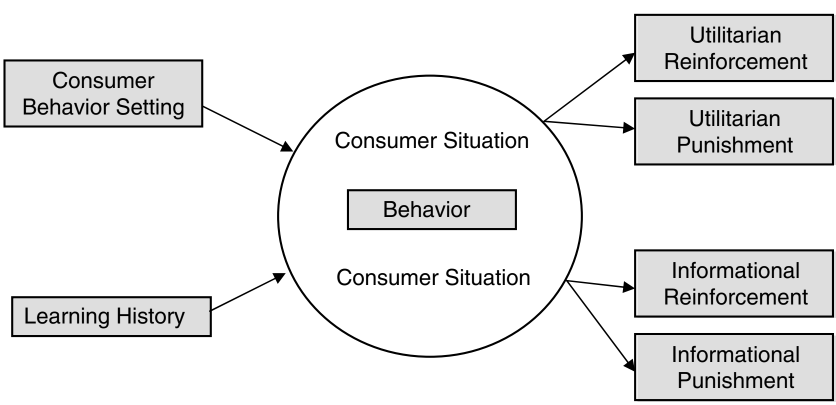

Figure 1.1 The Behavioral Perspective Model of Consumer Choice

Source: (Adapted from Foxall, 1996).

allowing consumers different degrees of control over their behavior. The more open setting, like for instance the park festival, grants consumers to behave in a relatively free way with the option to wander around, talk, listen to music, eat, drink, smoke or even leave the scene. Toward the other end of the spectrum consumers are less free in their choice and are indeed expected to conform to a pattern of behavior set by someone else. Schwartz & Lacey (1988, p. 40) describe a closed setting as where "only a few reinforcers are available, and usually, only one has special salience; the experimenter (behavior modifier) has control over conditions of deprivation and access to reinforcers; there is only one, or at most a few, available means to the reinforcers; the performance of clearly defined, specific tasks is reinforced; [...]; the contingencies of reinforcement are imposed and varied by agents not themselves being subjected to the contingencies; and there are no effective alternatives to being in the situation".

For example, according to society's norms, patients in a surgery's waiting area are expected to sit quietly and wait in a patient manner until they are called for their treatment. Of course, they are free to read magazines, possibly chat with other waiting patients or walk out of the surgery if the waiting time is considered too long (in which case they will not receive treatment).

The other element of the consumer situation, the learning history, refers to the similar or related experiences a consumer has had before encountering the current behavior setting. This previous experience helps the consumer to interpret the behavior setting accurately by predicting the likely consequences her behavior in this situation will incur. In other words, the otherwise neutral stimuli of the behavior setting are transformed into discriminative stimuli, indicating the availability of three types of consequences contingent upon the consumer's behavior. First, utilitarian reinforcement refers to the direct and functional benefits the purchase and/or consumption of a product (or service) involves. These are benefits mediated by the product or service. Secondly, informational reinforcement circumscribes the more indirect and symbolic consequences of behavior, such as social consequences (e.g., social status and self-esteem). These are consequences mediated by other people and function as feedback to the consumer as how well he or she is performing as a consumer. The third type of consequence, costs to the consumer in monetary and non-monetary form, is the aversive outcome of behavior.

As an example, the utilitarian consequence of buying a car is the benefit of owning and using the product afterwards, in a purely functional and hedonic sense, for it gives, for instance, door-to-door transportation, with minimum weather exposure and spare time schedule. Conversely, the informational reinforcement of owning a car might be related to the social status and admiration of others, particularly if it is a prestigious and expensive car make (e.g., a Bentley or Mercedes). The aversive but unavoidable outcome of shopping is the surrendering of money at the cash point but also the time spent searching for an item. Foxall (1990) argues that all products or services contain elements of utilitarian, informational and aversive consequences. Additionally, like the behavioral setting scope, which can vary from highly open to highly closed, the reinforcement patterns of the BPM are arrayed as a continuum from high to low utilitarian reinforcement and from high to low informational reinforcement.

Thus, the probability of purchase and consumption depends on the relative weight of the reinforcing and aversive consequences that are signaled by the elements in the consumer behavior setting (*cf.* Alhadeff, 1982). According to this view, product, brand, and service attributes, including price, may be interpreted as programmed reinforcing (i.e., benefits) and aversive events. Manufacturers, retailers, and brand managers direct all their efforts to modifying and shaping the reinforcing and aversive properties of the attributes of their products and brands, so as to make them more attractive to the consumer. Branding, promotional activities, new product development and product selection are just a few options open to the supply side. These endeavors may or may not work, and this is why they ought to be interpreted as programmed reinforcing (or aversive) events rather then actual reinforcing (or aversive) events. According to this theoretical perspective, one of the main tasks in marketing is to identify what events can function as benefits (or aversive stimuli), to what extent, for what consumers, and under what circumstances (Foxall, 1992).

The theoretical framework has been used to investigate a range of phenomena, such as consumer brand choice (Foxall & James, 2001, 2003; Foxall *et al.*, 2004; Oliveira-Castro *et al.*, 2005; Oliveira-Castro *et al.*, 2005, 2006; Foxall & Schrezenmaier, 2003), consumers' reactions to shopping environments (Foxall & Greenley, 1999; Foxall & Yani-de-Soriano, 2005; Soriano & Foxall, 2002), social responsible consumption (Davies *et al.*, 2002; Foxall *et al.*, 2006a), product search behavior (Oliveira-Castro, 2003), among others. The model has also served as inspiration to philosophical research that attempts to reconcile, in an epistemologically coherent way, behaviorism and cognitive psychology (Foxall, 2004, 2005). As it is not possible to explore all these topics within the present paper, some of the research that has been carried out on brand choice is presented next, as an illustration of the kind of investigation based on this theoretical approach to consumer behavior.

Consumer brand choice

In the last decades, several regularities have been discovered concerning consumer brand choice and the behavior of brands in the market (e.g., Ehrenberg, 1988), which should be considered by any researcher interested in the topic. Using consumer panel data of mainly, but not only, frequently and regularly bought branded consumer products, Ehrenberg and colleagues have analyzed enormous amounts of data and reported interesting and systematic results (for examples of and detail about the research program see Ehrenberg, 1988; Ehrenberg *et al.*, 1990; Ehrenberg & Scriven, 1999; Ehrenberg *et al.*, 2004; Goodhardt *et al.*, 1984; Uncles *et al.*, 1995). One of the important findings stemming from this research program is that most consumers practice multi-brand purchasing, choosing apparently randomly from a small "repertoire" of often three or four brands in a particular product category. Most of the brands are perceived to perform in a functionally similar way and are therefore assumed to be substitutable. Furthermore, during a period of one year, in order to meet their requirements in a product category, consumers of any given Brand A tend to buy other brands more often than they buy Brand A. For example, in the US breakfast cereal market consumers make on average about four purchases of the brand Shredded Wheat in one year, but buy other brands about 37 times in the same period (Ehrenberg & Goodhardt, 1977). By contrast, only a small proportion of consumers (approximately 10%) are exclusive buyers of or 100% loyal to any particular brand during, for example, one year. Sole buyers are described as relatively light users of their favorite brand, disconfirming traditional marketing research which claims that showing exclusive loyalty to one particular brand is equivalent to being a heavy user and therefore a disproportionably valuable to the company. This also contrasts with the widespread belief that higher loyalty rates lead to improved profitability (Reichheld & Sasser, 1990). When comparing across brands, results show that competitive brands differ mainly in the number of buyers they have and not so much in how loyal those buyers are, although there is a "double-jeopardy" (DJ) tendency, that is, brands with smaller market shares do not only attract fewer buyers of the product category but those buyers buy the brand less frequently than buyers of larger brands. All these results have been replicated across more than 50 product categories (for example, grocery products, aviation fuel, store choice, newspapers) and few exceptions have been found in the FMCG market, such as the observed deviations discovered in some US Spanish-language and religious TV stations, which attract heavy viewing from their relatively few viewers (Ehrenberg *et al.*, 1990).

This line of research has enabled the development of a mathematical model to describe the regularities found, the Dirichlet Model (Ehrenberg *et al.*, 2004; Goodhardt *et al.*, 1984), which comprises two main areas: repeat-buying patterns of whole product categories and brand-purchasing patterns. Thus, by making some basic assumptions, the model can specify probabilistically how many purchases in one product category each consumer makes in a time-period and which brand he or she buys on each occasion. Moreover, the performance of single brands can be predicted in different situations such as market introduction or during and after sales promotions (Ehrenberg, 1991; Ehrenberg *et al.*, 1994).

The Dirichlet is described as a "parsimonious" model because it requires limited input for its predictions due to the fact that it is defined for stationary (i.e., showing few or no trends) and unsegmented[2] (i.e., similar brands generally appeal to similar people) markets. The two main inputs into the model are (1) The penetration rate, i.e., the percentage of consumers who buy an item or the product category in a specified time-period; and (2) The average purchase frequency of buyers of the category or a particular brand during the same time. On the basis of these inputs, the three main parameters relating to the product category of the model can be estimated (Ehrenberg *et al.*, 1990): (1) How often consumers buy, (2) Which brands they buy, and (3) The size of the market. Finally, the only brand-specific numerical contribution to be made is the individual brands' market shares.

The model has been criticized mainly for the reason that it does not give attention to the underlying patterns and motivations of consumers and their purchases (Bartholomew, 1984; Jeuland, 1984) or the underlying variables (Popkowski Leszczyc *et al.*, 2000). It is certainly true that Ehrenberg's work has remained largely descriptive and has not questioned why consumers behave in the way that has been repeatedly observed. Goodhardt *et al.* (1984, p. 638) have also supported this: "why one person (or household) generally consumes more toothpaste or soup than others, or somewhat prefers brand *j* to *k* or vice versa, is not accounted for by the model and is in fact at this stage still largely unknown".

The following are some of the questions left unanswered by this line of research: (1) It has been assumed that brands within an individual's repertoires are functionally substitutes, but can this be empirically demonstrated or tested? (2) Is the quantity consumers buy on each shopping occasion relatively constant, as assumed by the model? (3) Although it has been assumed that any consumer can have any brand repertoire, how are brand repertoires formed? In what follows, lines of research that have investigated these questions are described.

Substitutability of brands and the matching law

Choice, according to behavioral interpretations, is usually treated as the rate at which a particular behavior is performed, usually in the context of other competing behaviors (Herrnstein, 1997). This view suggests that choice is not a single event but the distribution of behavior over time, for example, the proportion of times that A is chosen over B or B over C. The behavioral explanation for choice is sought not in mental deliberations, as cognitive psychology would suggest, but in the environmental events that accompany the behaviors in question, the pattern of reinforcement and punishment that increases or decreases the probability of those behaviors being repeated and the contingencies encountered. The analysis of any one choice (i.e., any one sequence of behavior) requires the analysis of other behavioral choices that might have been enacted instead and the configurations of reinforcement and punishment that maintain or inhibit them.

In the context of the study of choice in behavioral psychology, the matching law is a quantitative formulation describing a proportional relationship between the allocation of an organism's behavior to two concurrently available response options on the one hand and the distribution of reinforcement between the two concurrent behaviors on the other hand (Herrnstein, 1961). The matching law states that animals or human beings match their behavior in proportion to the reinforcement the behavior produces. In experiments using pigeons as subjects, Herrnstein (1961, 1970) found that organisms distribute their behavior between the two options according to the rate of reinforcement the behavior receives from responding to each option respectively. If animals such as pigeons have the opportunity to choose between pecking one of the keys x or y, where each of which delivers food pellets (reinforcers) on its own concurrent variable-interval sched-