

# Product Complements and Substitutes in the Real World: The Relevance of “Other Products”

In the real world, buyer demand for a product can depend directly and indirectly on the marketing efforts of “other products” in different categories. The authors offer a behavioral rationale for the existence of the effects of “other products” marketing efforts and propose a taxonomy of possible intercategory relationships. The discussion enables the authors to identify several promising new research directions.

**B**uyers make purchase decisions in a dynamic market environment, which affords them choices from enormous numbers of products and brands as well as influence from a diverse set of marketing efforts. Buyers may also be affected by the context of their previous purchases, ownership, and usage. Given such diversity, demand for a product depends directly and indirectly on many things, including the current or previous marketing efforts of “other products,” that is, products in different but related categories. The idea that demand in one product category can be affected by marketing efforts in another is not new (Erdem 1998), but the assumption that a common brand name may be needed for such transfer to occur is too limiting. Categories affect one another in ways that transcend common brand interactions.

Product substitutability and complementarity have long been natural ways to perceive intercategory<sup>1</sup> relationships.<sup>2</sup>

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<sup>1</sup>In this article, we use the term “intercategory” interchangeably with the term “interproduct.” As the title of our article suggests, we are concerned with the cases in which decisions in one product category affect buyer and seller decisions in another. We also would treat successive technology generations (e.g., 8-bit, 16-bit, 32-bit microcomputer CPUs) or the subdivisions of a coherent broader product category (e.g., portable computers: desktop computers, notebook computers, handheld computers) as separate categories for discussion purposes. Product category boundaries can be vague (Viswanathan and Childers 1999), but because we concentrate on the relationships between categories rather than their composition, such ambiguity is acceptable.

<sup>2</sup>For example, the literature addresses product substitution through research on new product success or failure (e.g., Cooper

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Products are considered complements (substitutes) if lowering (raising) the price of one product leads to an increase in sales of another (e.g., Bucklin, Russell, and Srinivasan 1998; Russell and Bolton 1988; Russell and Petersen 2000).<sup>3</sup> Economic theory emphasizes static demand effects associated with “other products,” because complements and substitutes usually are defined in terms of extant cross-elasticity measures (e.g., Deaton and Muellbauer 1980). Figure 1 depicts the conventional framework.

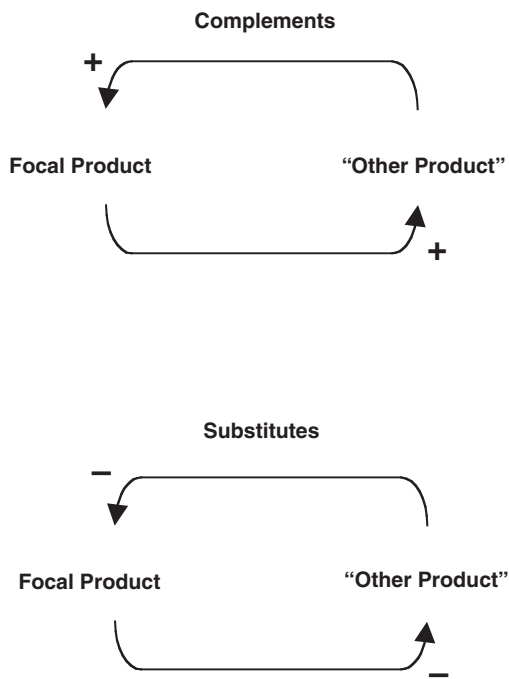
Unfortunately, this dichotomy does not fully consider the richness of plausible interproduct effects on buyers and their market behaviors. For example, consider the devices used for personal communication: landline telephones, wireless telephones, and pagers. Are these products complements to or substitutes for one another? How can the interproduct relationship between wireless telephones and personal data assistants (PDAs; which are taking on wireless communication functions) be characterized? These products and the dynamic interrelationships between them do not seem to fit neatly into the conventional complement/substitute framework. A new product introduction is often construed as offering yet another alternative that buyers can choose rather than an alternative that can change the very nature of a market structure (e.g., as Enterprise has done in

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2001) and technological obsolescence (e.g., Christensen 1997; Utterback 1994). Product complementarity is addressed through research on product bundles (e.g., Eppen, Hanson, and Martin 1991; Gaeth et al. 1991; Guiltinan 1987; Yadav 1994). Our interest is in transcending these static concepts.

<sup>3</sup>For the sake of clarity, throughout this article, we discuss intercategory effects in terms of just two alternatives. We recognize that in many markets there are more than two products that interact (e.g., a large-screen monitor, color printer, modem, hard drive, CD-ROM, speakers, and memory all interact in the PC market). Such cases need not require a separate discussion because the alternatives can be considered in pairwise fashion. Research is needed to understand more complex cases in which contingencies and interactions among categories are present (e.g., slower technological development of one system component may handicap others; modems capable of faster data transmission speeds than the input-output devices they connect to or the lines over which they transmit may limit the speed of the chain).

**FIGURE 1**  
**Conventional Framework of Product**  
**Complements and Substitutes**



the rental car market). The introduction of a complement may increase sales of a target product or make it more suitable for more applications than it was previously (e.g., longer-life batteries improved the range of applications for laptop computers). The availability of more (differentiated) alternatives can increase the possibility of buyers finding new uses for existing products (e.g., efforts to improve bottled waters have led to new categories of water) or finding added value in complements that already exist. Recognition of a new complementary entry (e.g., microwave ovens) may alert perceptive marketers of complements to new sales possibilities (e.g., microwave popcorn, addition of a popcorn function button), because a product may be able to provide greater convenience without significant downside (e.g., taste, cost). In addition, a new product introduction can potentially change a market structure by creating new benefits or costs or by extending the range of existing benefits (e.g., Japan's entry in the U.S. automobile market had a significant effect on expectations of quality and reliability; the availability of antilock brakes and air-bag options most likely affected the importance of safety in consumers' car-buying decisions).

The recognition of product complements and substitutes may, in turn, lead to the recognition of features of one product that can usefully be applied to improve another product (e.g., capabilities previously associated with televisions, such as an "instant-on" push button, might improve personal computers [PCs]; MacMillan and McGrath 1997). For

example, Kim and Mauborgne (1999) suggest that market-driving new businesses succeed because they incorporate strengths and reduce or eliminate the weaknesses of competing alternatives. For example, they consider personal-finance alternatives that were available before the introduction of Quicken (i.e., accounting software and pencil and paper). Kim and Mauborgne argue that Quicken is successful because it is able to combine the low price and ease-of-use of a pencil with the speed and accuracy of traditional personal-finance software. Knowledge of existing complementary relationships is also essential for the identification of desirable product systems (e.g., wireless telephones with calendars and games may be sensible, whereas wireless telephones with camera capabilities may prove less so, even though both are technologically feasible). The incorporation of existing complements can even legitimize a new product combination because at least one market segment already purchases both separate products.

Despite the pervasiveness of intercategory relationships in the marketplace, most research that addresses competitive effects does not explicitly consider the effects of "other products." Such an omission may limit an understanding of why market structure is the way it is and may create inaccuracies in managers' abilities to predict outcomes of their marketing actions. Thus, a major purpose of this article is to sensitize researchers and managers to the relevance of "other products." As managers find uses for multicategory sales and marketing data, market research firms will be more willing to collect and disseminate them. As occurs with products in general, the ready availability of such data will likely stimulate managers and researchers to find more uses for them (much as has occurred with scanner data). We expect that more attention will be paid to hypothesizing and measuring multicategory effects.

There have already been calls for greater realism in the research of market behaviors. For example, in introducing their research into customer dynamics, Heath and colleagues (2000, p. 291) note the following: "[T]he corpus of decision theory remains focused on single decisions.... This limits our understanding of decision-making.... If we are to understand how earlier choices and ownership influence subsequent choices where competitors attack and defend turf through changes in product, price, and promotion, we will have to expand theories to recognize the many forces at work in complex settings." Day and Nedungadi (1994) strongly question the widespread managerial practice of simplifying market realities. We echo such concerns by noting, for example, that the bulk of market structure analysis (MSA) research has focused only on single-category competition. Greater understanding of the connectedness among products on the part of managers and researchers should help in the design of better strategies and tactics and in the prediction of their market outcomes. We believe this understanding will serve to

- Identify categories and brands that are the key competitor and complementor influences in the market structure (e.g., Brandenburger and Nalebuff 1996),
- Identify who relevant potential customers are and why (e.g., they may already be buying in related categories; Day, Shocker, and Srivastava 1979),

- Determine the attractiveness of potential opportunities (e.g., Lehmann and Winer 2000), and
- Develop appropriate competitive strategies for realizing opportunities (e.g., Porter 1980).

A major reason for the current inattention to “other products” may be a lack of a framework that helps researchers think about these effects and gives them a terminology with which to discuss them. Thus, another purpose of this article is to augment the traditional complement/substitute framework by proposing a broader taxonomy that incorporates several important static and dynamic intercategory relationships. Our discussion adds to the marketing literature on competitive dynamics that arise from the interaction of buyer and seller perspectives (e.g., Dickson 1992; Ratneshwar et al. 1999; Rosa et al. 1999) and, more important, enables us to suggest some promising new research questions.

## A Basis for Intercategory Effects<sup>4</sup>

### *Product Categorization*

Before we discuss the rationale for intercategory effects, we consider product categorization and its role in individual-level decision making. The psychology and consumer behavior literature has examined cognitive representations of categories and their ensuing information-processing implications (e.g., Alba and Hutchinson 1987; Barsalou 1991; Murphy and Medin 1985; Rosch 1978; Smith and Medin 1981; Viswanathan and Childers 1999). However, only limited work has addressed key issues of why categories form and how they evolve (e.g., Bettman and Sujan 1987; Rosa et al. 1999) or how to define and distinguish them (e.g., Do different generations of a high-technology product belong to the same or different categories? Ratneshwar and Shocker 1991).

Both buyers and sellers believe it is useful to categorize products. For buyers, categorization simplifies information processing and decision making, and it facilitates interpersonal communication. Categories provide a context in which similarities and differences among brands can be highlighted. A category name can efficiently communicate much meaning. People are also sensitive to the correlational structure of their environments and, in the interest of cognitive economy, may categorize products (at least temporarily) on the basis of factors such as physical resemblance, perceived similarity of producers, or fit with available category labels (Day, Shocker, and Srivastava 1979). From a seller’s perspective, categorization speeds up individual buyer learning about new products and facilitates diffusion and promotion through word of mouth among potential buyers. Categorization also enables easy communication between producers and distributors (e.g., through stockkeeping units and billing information). Thus, product category formation and evolution is the consequence of purposeful behaviors on the part of both buyers and sellers. Rosa and colleagues (1999) present empirical evidence that product markets are socially constructed and evolve from interactions between buyers

<sup>4</sup>This section borrows extensively from Russell and colleagues (1999).

and sellers. Product markets may not always be coincident with a single product category; that buyers and sellers each need to make sense of the other’s behaviors also accounts for the fuzziness of some category boundaries and their seemingly ad hoc nature (e.g., Day, Shocker, and Srivastava 1979; Viswanathan and Childers 1999).<sup>5</sup>

Strong arguments can also be made for a constructive, flexible, and goal-driven view of product categorization. First, there is considerable evidence that buyer motives and goals are important in determining buyers’ mental representations of products, that is, which alternatives they attend to and which aspects they consider more important (e.g., Barsalou 1985; Loken and Ward 1990; Ratneshwar, Pechmann, and Shocker 1996; Ratneshwar and Shocker 1991). Second, category representations may be flexible because they can be contingent on goals that are salient in any given usage situation or context (e.g., Bagozzi and Dholakia 1999; Barsalou 1991; Ratneshwar and Shocker 1991). For example, Ratneshwar and Shocker (1991) find that category typicality judgments people made in the context of specific product-usage situations (e.g., snacks that people might eat while drinking a beer at a Friday evening party) were significantly different from judgments they made in response to simpler category cues (i.e., snack foods). Apparently, the contextual information framed buyers’ perceptions by focusing their attention selectively on situation-relevant aspects of products (i.e., whether a snack is salty, crisp, divisible, and convenient to eat at a party).

In mature product markets, many different products that serve the same general need can coexist (e.g., both subcompacts and pickup trucks provide personal transportation). A key reason for the proliferation of categories is that producers face technological barriers to serving multiple, specific buyer goals optimally (e.g., it is difficult to provide both fuel efficiency and roominess in personal transportation). Across buyers or households, there also may be heterogeneity in preferences in terms of the importance they attach to different goals or desired benefits (e.g., fuel efficiency versus roominess). Given both technological constraints and buyer heterogeneity, producers create, label, and position different products to serve disparate buyer goals optimally (Ratneshwar, Pechmann, and Shocker 1996). In such cases, buyers are likely to perceive that products in the same category deliver only on certain goals and that options in different categories have negatively correlated attributes.

### *Intercategory Effects*

Russell and colleagues (1999) identify three ways that choices across different product categories can be linked: (1) cross-category consideration, (2) cross-category learning, and (3) product bundling. In cross-category consideration,

<sup>5</sup>Important questions that cannot be answered here are, What exactly is a product category? How are they created (by buyers, sellers, or others)? and How do they evolve? We assume that categories exist, that they have a hierarchical structure (in which superordinate and subordinate categories complement a main category), and that new generations may also be new categories when they are sufficiently differentiated. However, the arbitrariness of category definition should not detract from the points we make herein.

several product categories (and possibly many options or brands in each category) are effective substitutes (Srivastava, Alpert, and Shocker 1984). Roberts and Lattin (1991), Shocker and colleagues (1991), and Graonic (1995), among others, provide empirical evidence for the existence of multicategory choice sets.

An intercategory effect can also be activated by the context of previous choices. Such cross-category context or learning effects are present when choice in one category is influenced by the prior possession of, experience with, or use of products in other categories. A buyer who is satisfied with a certain brand (e.g., Maytag) or technology (e.g., digital) in one category (e.g., washing machines, pagers) may be more likely to purchase from another category in which the same brands or technologies appear (e.g., dishwashers, wireless telephones; Erdem 1998; Kim, Chang, and Shocker 2000).

In product bundling, items from multiple categories jointly contribute to fulfill buyers' wants, which leads to buyers selecting several different products (usually on the same or proximate shopping occasions). Most complementary products used together fit into this classification even though they are not always purchased together (e.g., hot dogs and buns, computers and software). Sellers often assemble bundles that consumers can accept or reject (e.g., a package of standard equipment for a new car). In some cases, distributors or consumers assemble the package (e.g., a stereo "system" that comprises complementary components from competing firms, such as a Sony receiver with Yamaha speakers, even though each brand offers both components). It is less recognized that consumers often examine products category by category and create their own (personalized) bundles (e.g., an assortment of liqueurs to serve to guests after dinner, a grocery shopping basket; Farquhar and Rao 1976; McAlister 1979; Russell and Kamakura 1997). Bundles are items that buyers might purchase together, because the items meet a buyer's goal (e.g., convenience) by being available from the same store or supplier. However, a retailer may serve other buyer goals by, for example, prepackaging products to be sold as gifts (saving time) or by assembling different category components (ensuring compatibility and connectivity).

In all three ways, the buyer's purposes or goals are central. Purpose (which is sometimes implicit in a usage or purchase situation) provides coherence for the multicategory decision by helping define the benefits that the buyer wants (Bagozzi and Dholakia 1999; Yang, Allenby, and Fennell 2002). The definition of relevant benefits is often tantamount to the definition of the products that buyers will consider. It is possible that product categories have hierarchical relationships because the purposes that influence their construction are also hierarchical (Ratneshwar, Mick, and Huffman 2000). Products are able to serve multiple purposes because they provide "affordances," which, according to Ratneshwar and colleagues (1999, p. 194), are "the potential benefits and disadvantages of a product ... in relation to a particular person" that can be actualized on different occasions. Thus, consideration of product complementarity or substitutability without controlling for the effects of purpose creates ambiguity.

Ratneshwar and colleagues (1999) provide evidence in support of three factors that affect product and service decision making. In addition to purpose, they recognize that the awareness and availability of products and services matter to the decision maker for at least three reasons. First, constraints on the number of available alternatives (e.g., a restaurant with a limited selection of entrees) may force consumers to consider and choose across multiple categories (Johnson 1989). Second, the visual configuration of choice alternatives may juxtapose multiple competing categories and thus prompt cross-category consideration (e.g., restaurant menu, retail store display, mail-order catalog, Web site). Third, access to certain complements already used may enable a buyer to use a core product in particular ways (e.g., a PDA with an add-on that enables it to function as a wireless telephone and offers synergy that may afford it some advantages over more specialized products). The buyer's own preferences (conditioned by past experience and knowledge) are also important. In addition, the context of "other products" and buyer preferences may play a role in defining relevant product substitutes. Thus, the "three P's," or person, products, and purpose, are useful factors for examining why multicategory decisions occur and for predicting their possible outcomes.

We began this section by noting that categorization is an important function of people's decision making. Buyers' and sellers' product categorization is based on commonly understood sets of related products that facilitate communication. Although buyers create categories to simplify decision making, their choice processes often span multiple product boundaries (Ratneshwar, Pechmann, and Shocker 1996; Viswanathan and Childers 1999). A key reason for this is that buyer purposes or goals are situation specific, whereas at least in the short run, categories remain reasonably stable (Srivastava, Leone, and Shocker 1981). Buyers need not respect single category labels if alternatives in a particular category are not adequate to satisfy their purposes or if products in different categories are adequate (Shocker et al. 1991). Sellers have similar freedom, and by offering new product alternatives, they can sometimes even change category meanings (e.g., the phrase "taking an aspirin" became inadequate as a description of all painkillers when acetaminophen, ibuprofen, naproxen, and others entered the market).

## What Are the Plausible Effects of "Other Products"?

In this section, we provide an extended view of intercategory relationships, a view that moves beyond the conventional framework of complementarity and substitutability to consider the richness of plausible effects more fully. Our taxonomy of intercategory relationships in Figure 2 includes both static and dynamic cases. Static relationships are stable and tend to persist largely unchanged for a long time. They are sustainable at an individual level because the categories continue to fulfill similar buyer requirements (stable purposes). Static relationships may offer similar performance/price ratios (Kim, Chang, and Shocker 2000), and they may include products that can be simultaneous complements and

substitutes; for example, a hamburger and a diet soft drink are normally complements, but because consumption of the low-calorie diet soft drink may enable buyers to rationalize consumption of the high-calorie hamburger, the products also have a substitute relationship. Because some purposes arise relatively frequently and others arise only occasionally, static buyer behavior may reflect the different learned responses or environmental circumstances that influence buyer behaviors.

In dynamic relationships, the products and/or their relationships are in transition over time, and the products ultimately may not coexist. Dynamic relationships may reflect (1) product order of entry (i.e., a category that already exists and serves as a context for decision making and affects factors such as product appreciation and access to distribution channels); (2) transitions between substitutes and complements in which complement bundles become substitutes for the original unbundled products (e.g., a clock radio can substitute for a dedicated clock and dedicated radio), or products that were originally designed as imperfect substitutes come to coexist as complements (e.g., pagers and wireless telephones, e-mail and voice-mail); (3) transitions within complements in which originally nonessential complements

become more essential; and (4) transitions within substitutes in which either the new or the existing product eventually dominates.

Figure 2 is framed in terms of possibilities that operate at the individual-buyer level (i.e., what an informed buyer who is knowledgeable about the relevant categories might comprehend). Because relationships can change with time as categories are modified and because buyers are heterogeneous in terms of their awareness, knowledge, and purposes, aggregate market relationships may not always indicate the individual-level effects that underlie them (i.e., aggregate intercategory relationships may merely represent an averaging of the heterogeneous relationships at the individual level).

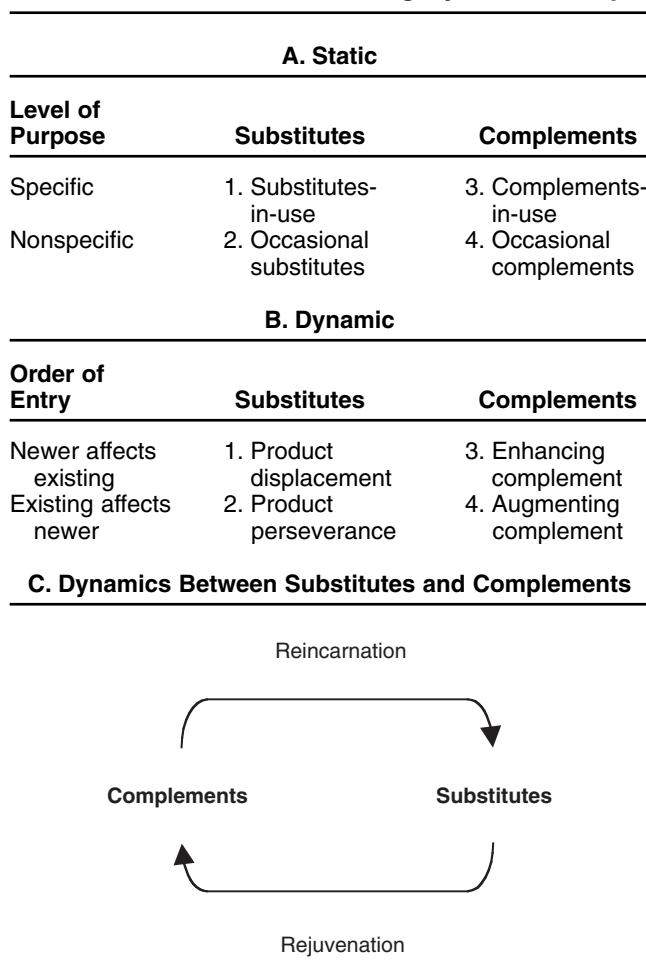
### Static Intercategory Relationships Across Buyers

*Substitutes-in-use.* In the case of substitutes-in-use, multiple product categories compete because they are able to serve a similar defining purpose and thus may have similar potential customers (e.g., Srivastava, Alpert, and Shocker 1984; Srivastava, Leone, and Shocker 1981; see Figure 1). In this case, all competing products deliver requisite benefits, even though each may deliver against others as well. Because of trade-offs, one product often does not dominate the other (e.g., digital videodiscs and videotapes offer trade-offs in picture quality and cost that have enabled them to coexist; however, as cost differences narrow, the coexistence may change). Sometimes a price or distribution channel precludes the categories from competing more directly (e.g., national and private label brands); thus, the categories' substitutability becomes evident only when the more expensive brand is on sale or when they have similar distribution (Blattberg and Wisniewski 1989). The relationship is often asymmetrical in magnitude; for example, a national brand may serve a broader set of purposes than a private label product (particularly in the case of conspicuous consumption), and thus the latter may not substitute effectively even when it is on sale. General purpose products (e.g., laundry detergents) can be substitutes for more specialized or niche products to a meaningful degree (e.g., other cleaning products), but the converse may not hold.

Preferences among substitutes-in-use can largely be a matter of buyer taste rather than performance quality alone. However, these products still negatively influence one another's sales. A desire for variety or redundancy may sometimes motivate the purchase of substitutes, thereby creating a form of complementarity. Stair-climbers, stationary bicycles, rowing machines, and treadmills all offer an aerobic workout and thus may be considered substitutes, even though some are more suitable for certain buyer segments (e.g., recumbent bicycles may put less strain on the back than conventional stationary bicycles; Graonic 1995). Substitutes-in-use need not physically resemble one another, but they can do so if form is essential to function. Services can substitute for products (e.g., leasing rather than owning a car or computer, software-based services that perform the same functions as hardware). What is important is that it is primarily the "person" in the three P's framework that determines the extent of substitutability.

**FIGURE 2**

### An Extended View of Intercategory Relationships





*Occasional substitutes.* Occasional substitutes satisfy a higher-order, more generic purpose. Purpose is hierarchical; there may be general or superordinate purposes and more specific subordinate purposes. The more general the purpose, the greater is the number of products that provide a degree of competition (e.g., several products all serve the general purpose of providing “pleasure,” but a buyer will only purchase one of them because of budget constraints; Lehmann and Winer 2000). Because of this generality of purpose, the specific alternatives and their actual substitutability may be highly idiosyncratic because a person’s preferences play an important role.

Even at the same level of specificity, categorization of certain new products may be amenable to cues. An overriding purpose might be suggested by the context of “other products” or the physical form that they assume. For example, granola bars might originally have been credible as candies, cookies, health foods, or a separate snack category, but a section of the supermarket in which they are shelved can suggest a preferred positioning. Store traffic and image can be built by promoting certain brands and categories (Chintagunta 2002). Because inherent ambiguity remains, the focal product may retain some substitutability with products in each of its plausible categories (e.g., granola bars can be substituted for cookies). The packaging of products in containers associated with another category can strengthen (or weaken) associations with the product’s category or with another category’s major benefits (e.g., gel toothpaste packaged in containers associated with mouthwash may strengthen its breath-freshening associations).

*Complements-in-use.* Complements-in-use enhance the growth prospects of one another, and their coexistence is affected by user purpose (see Figure 1). For example, PCs and application software have exhibited a positive, reinforcing influence on each other for more than 20 years (e.g., Gates 1998). In many cases, complements-in-use are products that essentially have limited value without the other (e.g., hardware and software; television sets and programming). In other situations, such complementary products can be used independently, but they usually are not because a superior result can be achieved jointly. Recognizing these intercategory relationships, firms have often followed a pure or mixed product-bundling strategy (e.g., Eppen, Hanson, and Martin 1991; Guiltinan 1987). For example, airlines and travel-related Web sites offer mixed bundles that include air travel, lodging, and rental cars; some physicians require that their patients undergo various multicategory diagnostic procedures (pure bundling) with their physical exam.

*Occasional complements.* Occasional complements offer another array of possibilities. For example, products that are intended to be used together exert design influences on each other (e.g., the size of a briefcase or the trunk of a car should reflect the size and nature of the “other products” they are intended to contain). Prominent features of one product may be used to describe similar features in another. These effects can be unrelated to price. Products that are commonly sold in the same stores or displayed near one another may exert weak effects on one another’s sales. A buyer’s observation of one product may influence impulse

buying of another as a result of a kind of “reminder” promotional effect. A brand name that has strong associations in one product category (e.g., Johnson’s Baby Shampoo) may transfer the associations to others (e.g., bandages, talcum powder) that may be weak complements (Loken and John 1993; Russell and Petersen 2000). As part of their rationale, cobranding or branded ingredient strategies have such cross-category associations (Park, Jun, and Shocker 1996).

### ***Dynamic Intercategory Relationships Across Time***

*Product displacement.* Product displacement is a substitute relationship in which “new and improved” categories come to dominate older ones and eventually make them obsolete. It is notable that an older product can contribute to its own demise by sensitizing customers to its deficiencies, which then speeds the adoption of a new product that promises relief. When retailers recognize product superiority for their customers, a newer product may use the same channels of distribution as the older product (e.g., compact discs [CDs] are sold in many of the same outlets that formerly sold cassettes and records). Sellers can force or speed displacement by phasing out and ceasing to supply the older product when both appeal to similar customer bases (e.g., Apple removed floppy disk drives from its new PC models in favor of CD or digital videodisc drives). Successive product generations often fit this case (e.g., among PC peripherals, 3.5 inch disk drives originally displaced 5.25 inch drives because the newer disks were more durable and smaller and offered greater data capacity at little or no extra cost).

Sometimes the displacing product creates a new category instead of serving as a subcategory of the displaced product (e.g., cars replaced buggies as basic transportation, calculators replaced slide rules). Presumably, the greater the differences between the new product and the previous category (e.g., physical appearance, technological platform, manufacturer), the greater is the likelihood that previous category labels no longer suffice. It is also possible that when the first mover appears, initial attempts at categorizing the innovation evoke existing categories (e.g., horseless carriage), but as more competitors enter with similar products, a new category name is created (e.g., car). The speed and magnitude of displacement should depend on whether the benefits and costs (i.e., the value proposition) of the newer product dominate the older product. Writeable CD-ROMs, superdrives, zip drives, and portable hard drives are categories that now compete to replace many applications that the floppy disk previously handled. Displacement seems inevitable whenever a newer product offers higher (equal) levels of all core benefits that are provided by the older product but at little or no added cost (i.e., a higher performance/price ratio). When products are displaced, they may be scrapped or diverted to less prominent uses or less sophisticated users. When this happens, new purposes sometimes become relevant (e.g., calculators are used for more applications than slide rules ever were).

Displacement is an outcome of competitive rivalry, as are coexistence (implied by substitutes-in-use) and product perseverance. What makes these cases dynamic is the

method and time frame in which competition occurs. The phrase “predator–prey” characterizes a class of such dynamics (Moore 1993). Targeting similar customer needs, a new product (the predator) that is usually equipped with a higher level of technology than existing products enters the market and encroaches on the incumbent products’ (the prey) market potential (e.g., Berryman 1992; Moore 1993). Facing new threats, the incumbent firms either disappear or react by enhancing their competitiveness. These firms’ efforts can take the form of product or process improvements, lowered prices, or product repositioning. For example, plastic containers have largely displaced fiber cans for motor oil because of their ability to be opened without a tool and their integration of a pouring spout. Clear plastic has largely displaced glass bottles because of its lighter weight, squeezeability, and greater resistance to breakage at only slightly higher cost. However, in the case of all-plastic containers (the predator) threatening paper cartons (the prey) for refrigerated juices and milk, manufacturers of paper containers were able to fight back by adding plastic coating and pouring spouts with screw-on caps to improve the containers’ functionality, thereby leading to coexistence.

*Product perseverance.* Product perseverance is a substitution type wherein a newer category fails to displace the older one. Although many factors have been offered to explain new product failure (including the possibility of inadequate marketing), failure to meet customer needs adequately is a frequently cited reason. A manager may misjudge whether the benefits of the new product exceed the old or fail to understand the full range of added costs that the new product’s purchase or use necessitates. For example, in the PC industry, the first handheld PDAs did not fare well against incumbent products (e.g., laptops, paper-based organizers) even though a later variant (the Palm Pilot) has been quite successful. A new product that has poor underlying technology can impede the success of later products based on the same technology (e.g., Microsoft’s Bill Gates stated that the Apple Newton fiasco hindered development of the handheld PDA product category; Bayus, Jain, and Rao 1997). Buyers may be sensitized to the aspects of the product (e.g., handwriting recognition) that were troublesome in failed versions, which creates a ready market for a credible improvement. In addition, a brand may be unable to reintroduce an improved version of a failed product (e.g., Apple eventually cut its Newton division because management believed the company was not strong enough to resurrect the brand) despite subsequent evidence of turnaround in the category.

Analogous to the predator–prey relationship is one that we term “prey–predator” (Moore 1993). A prey–predator multicategory relationship is characterized as a kind of competitive role reversal. The new product enters the market because it senses opportunity in the limitations of existing products, but by exposing the limitations, it awakens the existing product, which then becomes the victor. An example is DuPont’s Corfam (see Hounshell and Smith 1988). After years of development and heavy research and development expenditures, in 1964 Corfam was heralded as the technological product substitute for leather. Targeting the

high-end shoe market, Corfam had proved itself in tests to be equal or even superior to fine leather because it was unaffected by moisture, weighed one-third less than leather, kept its luster, and did not need to be broken in. Although DuPont initially faced retailer and consumer resistance to Corfam shoes, the critical factors that spelled Corfam’s death were the entry of European fashion shoes made of many different styles of leather and the leather industry’s promotion of glove-like leathers, which Corfam could not duplicate. Thus, Corfam was relegated to competing with cheaper vinyl shoes. Although Corfam was superior to vinyl, DuPont could not earn a profit because of Corfam’s high manufacturing costs.

*Enhancing complements.* Enhancing complements occur when a newer product enhances the sales of an existing one by improving its functionality (e.g., increased availability, easier to use). In general, enhancing complements lead to higher benefit levels for the existing product with which they are used rather than introduce new benefits (Kim and Mauborgne 1999). Well-publicized uses for the newer product increase the likelihood that many buyers will insist on such higher benefit levels in existing and future products. In this case, the newer product positively influences sales of the existing and more basic product. Enhancement also occurs as a result of training or learning. Owning a bicycle may create a feeling of freedom that will subsequently be enhanced by automobile purchases later in a person’s life. In such relationships, the interfaces between product components can be especially important, and sales of the enhanced products are furthered by a common standard to ensure compatibility and interchangeability (Shapiro and Varian 1999). Sometimes the interface itself becomes another product that is needed to make a product system function better (e.g., modems enable communication between the Internet and PCs; a car kit enables a portable CD player to play through the existing car radio).

*Augmenting complements.* Augmenting complements add new benefits that were not formerly present in an existing product (e.g., combining a radio with a clock allowed for an alarm of varying sound and enabled a buyer to program the radio). Augmenting complements often are synergistic and usually are cases in which an existing product has a major sales effect on its newer complement, because its limitations either have created reasons for a complement to exist or have legitimized its existence. For example, e-mail capability (existing product) positively affects a buyer’s ownership of a digital camera (newer product) because it enables photographs to be sent with text as well. There may also be priority patterns that determine the order in which related products are purchased; that is, more basic purposes may be satisfied before less basic purposes (e.g., a washing machine before a dryer, a savings account before a mutual fund investment). Again, common purpose may influence people’s purchase sequence (Harlam and Lodish 1995). Marketers can influence sales of augmenting complements by means of the ties with older products they emphasize in rationalizing or positioning the newer product. This can help buyers better understand the fuller range of product benefits,

that is, the combined benefits of both products (Eppen, Hanson, and Martin 1991).

Sometimes the relationship between products can be both substitute and complement; that is, two products may be complements for one purpose but substitutes for another. These individual-level effects may cancel one another out so that an aggregate intercategory relationship distorts individual-level realities. Different users may purchase products for different reasons or the same users may use products differently at different times or in different contexts. The multiple uses that such products serve may be their major (possibly unrecognized) competitive advantage. For example, a VCR is a complement to a television when it provides an additional tuner to enable picture-in-picture capabilities or the recording of one television show while watching another, but the VCR also is a substitute input to an antenna, cable, or a satellite dish. As another example, television news, news radio, news magazines, the daily newspaper, and the Internet are complements because they are differentiated by timeliness and depth of reporting (e.g., some are immediate and others are delayed, some offer analysis in addition to headlines). However, these products can also be part of a substitute portfolio of products purchased by someone who desires limited detail (McAlister 1979). Product bundling or other product complexity sometimes enables the resulting product to play multiple roles in terms of its relationships with other products.

### ***Dynamics Between Complements and Substitutes***

There are dynamics not only within substitute categories or complements but also between the two. Changes in buyer demands may result in a gradual shift from noncompetitive intercategory modes (i.e., complements) to competitive ones (i.e., substitutes), and vice versa. We term these modes *reincarnation* and *rejuvenation*, respectively. As an example of reincarnation, consider the relationship between Microsoft's Windows operating system and Netscape's Navigator Web browser, which was initially an augmenting complement. An awakened Windows became the predator after it incorporated its own Web-browsing capability (Gates 1998). Another example is the relationship between wired and wireless telecommunications technologies. Initially, the wireless telephone was an enhancing complement to regular wired telephones (i.e., used for different purposes). Recently, because of "free" long distance and other pricing practices, consistent quality improvements, and the long delays required to obtain wired telephone installation, in many Asian countries and increasingly in the United States it is common for wireless telephones to displace wired telephones for regular use at home.

As an example of rejuvenation, consider film entertainment in the 1950s. When television was first introduced, it was presumed to represent a major threat to motion pictures because a person could watch movies at home instead of traveling to the theater. Both were forms of entertainment, but they had different uses, users, and occasions for use. Television's small screen, inconsistent reception quality, and the initial absence of color were major hurdles. However, because of the perceived threat, movie studios refused to allow their facilities to be used to produce television shows

and ran large-scale promotional campaigns that urged consumers not to purchase television sets (Boddy 1990). Television persisted, though, and the two entertainment modes coexist today. Eventually, movie studios became producers of television shows, which became an even bigger business for them than movie production. They belatedly realized that so long as first-run movies were not aired contemporaneously with their showing in theaters, television could serve as a complementary entertainment medium.

In some industries, technological progress and market restructuring occur so quickly that intercategory relationships oscillate in a relatively short period. An example of this is the wireless telecommunications market in Hong Kong (Kim, Chang, and Shocker 2000) and elsewhere. When analog-type wireless telephones were first introduced to Hong Kong in 1986, most users came from the existing pager user group. At that time, people usually owned both a pager and a wireless telephone because of the unstable communication quality of the analog telephone (the products were enhancing complements). Because of continuous technological improvements to the wireless telephone, it began to substitute for the pager. From the late 1990s onward, the relationship has been evolving back to a complementary one in which many wireless telephone users also own pagers to check incoming calls while they have their wireless telephones turned off. In addition, by adding some augmenting complementary accessory functions (e.g., games, calendar, travel information), the pager has developed its own market niche.

## **Future Research Directions**

### ***In Which Circumstances Are Intercategory Effects Most (Least) Likely to Occur?***

Intercategory effects may be a consequence of differences in buyers' and sellers' category definition. If buyers consider benefits and costs and sellers consider product features and prices, such differences can arise. Research is needed both to better understand the nature and level of categorization that different decision makers use and to identify the circumstances in which cross-category consideration and choice are most (least) likely to occur. Whether the stage of product life cycle, individual differences (e.g., experts versus novices, different personality types), purpose, or other factors matter more has not been investigated. Although Ratneshwar, Pechmann, and Shocker (1996) provide empirical evidence that the individual characteristics of goal ambiguity and goal conflict lead to multicategory consideration, the possibility of other explanations (e.g., involving economic factors such as similar prices) needs to be clarified in further research. Managers should also be interested in findings that can provide guidance as to how intercategory effects are best used to the managers' advantage. However, no research has examined how easy or difficult it is to encourage normally single-category decision makers to consider other relevant alternatives.

It seems that economy (i.e., price), brand reputation, design, and versatility are examples of product benefits that can be readily measured across multiple categories. These benefits may serve as general dimensions because they are



closely related to superordinate buyer purposes or goals (e.g., buyers will only consider “other product” alternatives in acceptable price ranges or of acceptable brand names because of who they are or the purposes such products serve). Whether there are only special kinds of goals (e.g., gift giving) that favor multicategory over single-category consideration also is worthy of further investigation.

### ***How Does Multicategory Decision Making Differ from Single-Category Decision Making?***

Benefits and costs seem desirable for representing product alternatives in the modeling of multicategory decision making. If a new product has similar purposes as others and its benefit levels are known, an informed marketing manager may be better able to predict product success or failure. For example, if whitening ability, safety to clothes and environment, and economy are understood as the major benefits desired of laundry detergent, a product category that offers higher or equal levels of these benefits (assuming little additional cost) can be expected to be successful (product displacement). Similarly, a dominated new product can be perceived as having problems with product perseverance. Research is needed to find the best way to identify all core benefits, because it is their totality that determines a product’s market success. This problem is complicated but not unsolvable when a product is not dominant (or dominated) or when different market segments emphasize different benefits and costs.

An attempt to model decisions in terms of benefits and costs rather than physical characteristics raises questions of trust, credibility, and validity. Benefits are inferred by buyers and suggested by sellers (with puffery). Thus, if only the benefits of an alternative are described to a buyer, the buyer must ordinarily assume that the product will deliver the benefits. In addition, if a desired product is described to a seller, the seller must know how to create the bundle. Product analogies may prove useful in successfully describing benefits that may otherwise be ambiguous. Some benefits may be abstract (e.g., as safe as flying) or involve sensory characteristics for which well-developed vocabulary does not exist (e.g., tastes like Belgian chocolate, soft as a luxury hotel’s plush towel). Research can usefully determine how well prominent characteristics of highly familiar products are useful analogies for accurately communicating benefit levels (and which types of analogies do it better). This is important to Internet commerce in which certain goods may not be sold successfully against bricks-and-mortar competitors unless their sensory characteristics are validly described.

When do existing products provide a context that affects the evaluation of new substitutes and when will the first mover in a category be able to set its own norms? We have argued that “other products” can affect the reference points used in buyers’ decision making in another product category. Are there predictable circumstances when this occurs? Can experiences with “other products” or the marketing changes in those categories be more influential than same-category determinants of reference values? Carpenter and Nakamoto (1989) show that first movers can establish initial reference points or norms, but they do not establish the circumstances in which this would occur. Pricing research has shown that

reference points can change; it has identified a list of causes including substitute products (Kalyanaram and Winer 1995; Winer 1988), but it has not attempted either to measure when each has greater impact or to document circumstances in which experiences with substitutes may dominate experiences with the same products. The addition of complements to a core product can sometimes create a new category and affect change in reference values. Managers can benefit from greater understanding of the effects that their plausible actions in the same or related categories might have.

Another area of research importance is what might be termed “transfer of preference” (affect), which presumably is what makes brand extension effective (Bhat and Reddy 2001; Broniarczyk and Alba 1994; Erdem 1998). The literature establishes that the attributes or characteristics of a parent brand are more likely to be transferred to its brand extension than will overall liking or preference. However, the literature does not examine the possibility that modeling of buyer preference in one product category will enable such models to be used to predict choice in a substitute or related category (e.g., one that has benefit and cost similarities). Such a capability would be important in predicting demand for new products (as long as the products were close substitutes). Currently, using conjoint analysis, commercial research emphasizes data for decisions in a single category. It may prove possible (with appropriate scaling of weights) to preserve some information collected in a study (e.g., benefit–cost trade-offs) to approximate decision making in another study in a related category. Several researchers have noted that there are similarities in the importance of similar product characteristics (more likely with benefits than features) across certain categories with respect to decisions by the same person (e.g., Ainslie and Rossi 1998; Andrews and Currim 2001; Russell and Kamakura 1997). Research may find that all benefits need not be identical between categories for such research to be useful. Such findings might enable firms to save on future market research costs and aid a firm’s managers in becoming more market oriented.

Research might usefully examine the value that buyers place on the less important benefits that products afford (e.g., augmenting complements) because buyers may pay a higher price to obtain them. Can it be explained how ownership of a product that was purchased for one purpose or use increases the likelihood that a buyer will pursue other purposes for which the product is suitable? For example, when an “all-in-one” device is considered an alternative to dedicated printers, what value (if any) do buyers place on the extra benefits that product provides? Do product benefits that are not important at the initial purchase decision become more important later? (In a personal communication, the Nobel laureate Herbert Simon used the phrase “the importance of the artifact,” which is based on the observation that ownership of a computer led users to pursue new uses for it.) Will the all-in-one product be perceived as providing a higher level of an existing benefit (e.g., opportunity to learn new skills, greater versatility) in its competition with items in the dedicated category? Will one component (e.g., a printer) be inferred as higher quality because it was linked to a multitude of others (e.g., fax, scanner)? Do buyers ignore potential benefits (Ratneshwar et al. 1999) at the

time of purchase and discover them only later? Research is needed to better understand what makes multicategory decision making different from single-category decision making.

### **How Do “Other Products” Affect Product-Market Structure?**

Market structures have often been determined by means of perceptual mapping, but these maps offer only a snapshot of structure at a particular moment in time. “Other products” might provide key input to the modeling of dynamic changes in structure and enhancement of the prediction of change. Are there predictable patterns to how intercategory relationships will evolve? Intercategory effects seem particularly important when examined as processes over time, and research can usefully examine this. For example, buyer perceptions of product quality change, possibly because of changes in the environment of “other products” (e.g., enhancing complements may suggest quality improvements, thus making current customers less satisfied; augmenting complements may add new criteria by which buyers can judge quality). Quality perceptions often vary with user purpose, because purpose largely affects the benefits attended to by buyers and sellers. However, purpose may change as a consequence of “other product” availability (e.g., components that enable portability may make different product characteristics prominent). It may be possible to generalize about the determinants of quality from “other products” (i.e., substitutes, but perhaps also complements) that are used for similar purposes.

We noted previously that failed or limited technology in one category may limit the competitiveness of “other products” based on the same technology (and success may expand potential). Benefit limits in one category may enhance the appeal of a related product (e.g., pagers may have aided acceptance of wireless telephones). Such dynamic market structures might be used to verify that a particular historical evolution of substitutes and the existence of complements is necessary for a category to evolve similarly, such as in different countries. If a firm introduces only the latest generation of a product that is successful in one country into another country, the product’s rate of diffusion and eventual success may differ (e.g., analog pagers and wireless telephones may have been necessary to appreciate fully the subsequent digital versions).

Dynamics of change lead to migration between the intercategory relationships shown in Figure 2. There may be discernable patterns in such migration that historical research methods can reveal (Golder 2000). For example, in developing product strategies, there is often a strong incentive for an existing product to incorporate features that previously were complements (e.g., Microsoft Windows’ additions of features such as hard drive management, zip file capability, virus protection, a media player, and Web browsing). As the product evolves, the category itself may be redefined as the new one becomes a substitute for its former complement. Augmenting complements may evolve into a competitive mode as a newer product encroaches upon the existing one (e.g., self-service gas stations have largely made full-service

gas stations minor market players, automatic teller machines have replaced bank tellers). Practically every major university is considering the role of multimedia technologies and Internet applications in higher education and distance learning (Matthews 1999). The issue debated by university administrators is less whether the technologies are complements and more whether the technologies offer viable substitutes for face-to-face education in the future.

The intercategory dynamics may lead to either coexistence of related products or survival of some selected products. Bayus, Kim, and Shocker (2000) provide a review of the conditions that eventually lead to a single survivor or coexistence of related products. Empirical studies based on historical methods will increase the understanding of the characteristics of market and technological environments that affect the equilibrium conditions. Further research efforts should usefully examine the role that “other products” play in determining equilibrium from multicategory competition (e.g., dominance of the new entrant, speed of entry of facilitating complements). If it is discovered that substitutes-in-use deliver somewhat different benefit levels or benefit combinations, insights into the future evolution of the category might be obtained.

In dealing with multicategory effects, new methodologies for implementing even static MSA may be needed (for a discussion of challenges and research suggestions, see Elrod et al. 2002). Incorporation of complements, composite products (e.g., clock radios, all-in-one machines), and “other product” substitutes-in-use in the same study may require new modes of representation or different analytic interpretive skills. There will likely be greater problems of aggregation than exist presently because of factors such as heterogeneity in perceptions, multiple purposes or contexts in which different products compete (and the relative incidence of such purpose-defined submarkets; Bucklin and Srinivasan 1991; Yang, Allenby, and Fennel 2002), and different selections of substitutes and complements in each submarket. Different brands in a category may be significant competitors for some purposes (e.g., gift giving) but not for others (e.g., ingredients). Research might usefully examine the value of controlling for purpose (e.g., creating separate MSAs for each major purpose and later finding appropriate ways to integrate them). This research could be valuable for finding out not only how different the market structures are across different purposes but also the extent to which multiple purposes account for some heterogeneity that was formerly believed to be part of a single-category MSA.

### **What Are Additional Managerial Implications from Influences of “Other Products”?**

The study of “other products” may afford insights that are not otherwise available. Some buyers may be proactive, making choices from a broader set because they recognize single-category options as too limiting (e.g., because of inadequate convenience, affordability, and accessibility). For example, a buyer may prefer baking a cake from scratch to buying one ready-made or baking it from a mix because he or she can individualize it. If some buyers actively make choices from a broader set of category alternatives than oth-

ers do, knowledge of the set can increase the likelihood of discovering important buying criteria that may not have been revealed in a single-category context. Research is needed to confirm that the inclusion of relevant “other products” in a market structure helps reveal otherwise latent dimensions (decision criteria) that affect brand choice and aid in suggesting new product or repositioning opportunity.

Customers purchase from different categories for reasons, which, when better understood, might provide important guidance to marketing action. For example, potential customers of a given brand currently may be buying in substitute categories. However, if firms recognize the category substitutability, they might target those customers. In addition, there may be purposes that normally lead only to occasional substitution. Research might provide insights into ways occasional substitution can be increased (e.g., an exciting new product may encourage more gift giving). Different product design, changes in distribution channels or merchandising strategy, new packaging, or pricing might influence the incidence of intercategory substitution. Emphasis on new product combination with complements might lead to a distinct category whose positioning can be more affected by marketing action simply because it is less familiar to potential buyers. Behavioral research might usefully examine whether cueing “other products” influences which purposes are evoked.

It also seems that multicategory effects influence the ultimate effectiveness of managerial decisions about mergers and acquisitions and strategic alliance formation. An understanding of possible complementors will enable managers to better coordinate their marketing actions. Integrated marketing communications have long recognized the value of a coordinated program for a brand’s various promotional options, some of which are not entirely controllable (e.g.,

word of mouth, press commentary). The same integrative idea might be valuable in designing a marketing strategy in the context of “other products”; for example, a firm in one category may have an incentive to assist firms in another category in developing augmenting complements.

A notable consequence of intercategory effects is that a given product’s potential market size is not constant; it depends on what is happening with or could be made to happen to related “other products” (Bayus, Kim, and Shocker 2000; Peterson and Mahajan 1978). Kim, Chang, and Shocker (2000) offer a way to measure the magnitude of the possible positive and negative effects, but their model has been tested only with two data sets. Although the results are encouraging, the benefits of incorporating interproduct effects to improve forecast accuracy must be confirmed by additional research with other multicategory market data sets.

## Conclusion

The idea that demand may be interconnected across product categories is a powerful one. Awareness of the interconnections should sensitize academic researchers and managers to the possibilities that “other products” render intercategory effects more controllable or perhaps identify the circumstances in which the effects cannot effectively be controlled. Research results that make use of multicategory data will serve to encourage their subsequent generation and additional analyses, leading to further research results. We hope that this article will stimulate more research to enhance the understanding of these effects. An improved understanding of the roles of “other products” holds great promise for helping managers accomplish what is already a difficult job.

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