



12-2008

# Putting One-to-one Marketing to Work: Personalization, Customization, and Choice

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## Recommended Citation

Arora, N., Drèze, X., Ghose, A., Hess, J. D., Iyengar, R., Jing, B., Joshi, Y. V., Kumar, V., Lurie, N. H., Neslin, S., Sajeesh, S., Su, M., Syam, N. B., Thomas, J., & Zhang, Z. (2008). Putting One-to-one Marketing to Work: Personalization, Customization, and Choice. *Marketing Letters*, 19 (3), 305-321. <http://dx.doi.org/10.1007/s11002-008-9056-z>

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## **Abstract**

One-to-one marketing advocates tailoring of one or more aspects of the firm's marketing mix to the individual customer (Peppers and Rogers 1997; Peppers, Rogers and Dorf 1999; Shaffer and Zhang 2002). One-to-one marketing represents an extreme form of segmentation, with a target segment of size one. There are two forms of one-to-one marketing: personalization and customization. Personalization is when the firm decides, usually based on previously collected customer data, what marketing mix is suitable for the individual. A good example is Amazon.com's personalized book and music recommendations (Nunes and Kambil 2001). The e-commerce arena is replete with other instances of personalization. Nytimes.com allows readers to get personalized news articles of interest, MLS.ca in Canada screens houses for buyers depending on their preferences for location, size and features. Customization is when the customer proactively specifies one or more elements of his or her marketing mix. Dell computer allows customers to customize the computer they order. The MyYahoo feature at Yahoo.com allows users to specify elements of their home page such as the weather forecast, reports on their favorite stocks, or priorities given to local sports news.

The purpose of this paper is to summarize key challenges and knowledge gaps in understanding the choices that both firms and customers make in a personalization/customization environment. We start with a summary of personalization and customization in practice, and then draw on research in economics, statistical, and consumer behavior to identify what we know and do not know. We conclude with a summary of key research opportunities.

## **Keywords**

one-to-one marketing, CRM, customization, choice

## **Disciplines**

Business | Marketing

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## **Putting One-to-One Marketing to Work: Personalization, Customization and Choice**

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### **1. Introduction**

One-to-one marketing advocates tailoring of one or more aspects of the firm's marketing mix to the individual customer (Peppers and Rogers 1997; Peppers, Rogers and Dorf 1999; Shaffer and Zhang 2002). One-to-one marketing represents an extreme form of segmentation, with a target segment of size one. There are two forms of one-to-one marketing: personalization and customization. Personalization is when the firm decides, usually based on previously collected customer data, what marketing mix is suitable for the individual. A good example is Amazon.com's personalized book and music recommendations (Nunes and Kambil 2001). The e-commerce arena is replete with other instances of personalization. Nytimes.com allows readers to get personalized news articles of interest, MLS.ca in Canada screens houses for buyers depending on their preferences for location, size and features. Customization is when the customer proactively specifies one or more elements of his or her marketing mix. Dell computer allows customers to customize the computer they order. The MyYahoo feature at Yahoo.com allows users to specify elements of their home page such as the weather forecast, reports on their favorite stocks, or priorities given to local sports news. Figure 1 illustrates these definitions.<sup>1</sup>

The purpose of this paper is to summarize key challenges and knowledge gaps in understanding the choices that both firms and customers make in a personalization/customization environment. We start with a summary of personalization and customization in practice, and then draw on research in economics, statistical, and consumer behavior to identify what we know

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<sup>1</sup> While our terminology is consistent with that of others (e.g., Murthi and Sakar 2003; Godek 2002; Syam, Ruan, and Hess 2005), these terms are often used inter-changeably in the literature.

and do not know. We conclude with a summary of key research opportunities.

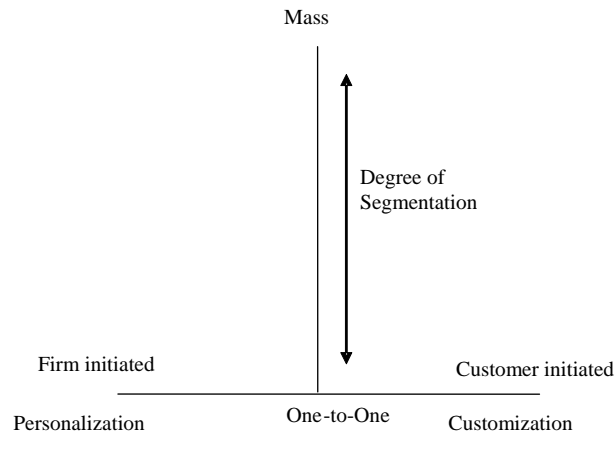


Figure 1: Understanding personalization and customization

## 2. Current Practices

### 2.1 Personalization

Perhaps the most popular example of personalization is Amazon.com. Amazon uses collaborative filtering to determine what music or books to recommend to users (Linden, Smith, and York 2003; Blattberg, Kim, and Neslin 2008). Indeed, the Internet has provided many opportunities for personalization. In ebay.com, the website can recognize the user and ‘fish’ out the previous trends of the user and the searches that he/she has made. The system then introduces appropriate related links on the website as the user browses. Search engines like Google and AltaVista analyze the types of searches the user undertakes over time. When the user searches for a similar topic on the search engine, the engine can respond faster and more efficiently.

The services industry has made ample use of personalization. For example, Sprint can analyze customer usage to determine the appropriate calling plan for the customer.<sup>2</sup> During the

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<sup>2</sup> Sprint Nextel, <http://www1.sprintpcs.com/explore/ueContent.jsp?scTopic=personalized>, Retrieved on Aug 10, 2007.

summer, the Portola Plaza Hotel<sup>3</sup> in California relies mainly on tourism. The hotel's objectives are to increase revenue and reduce inventory. Invitations are sent to previous customers directing them to a personalized URL that gathers information about guest preferences. After detailed analysis, mails are sent to these customers offering them discounts and other promotional offers to encourage them to come to the hotel. Using this procedure, the hotel saw a significant increase in revenue and was successful in retaining its customers. Personalization is practiced by many insurance companies like ICICI-Lombard, which uses a customer survey to prepare personalized insurance plans. Harrah's Entertainment personalizes many promotions and incentives based on what it learns from customer data (Watson and Volomino 2001).

The practical advantages of personalization lie in greater customer satisfaction and higher profits. For example, Malthouse and Elsner (2006) show in a field test that personalizing the copy used in a book offer increases response rates significantly. Notably, we are not aware of systematic study that shows personalization yields higher customer satisfaction in the long run, although the Portola Plaza Hotel example above certainly suggests so.

One concern is invasion of privacy. Personalization thrives on data, driving companies to stretch the envelope on what data they collect.<sup>4</sup> The customer wonders, "How do they know I want that book?" This may be why Amazon now explains its recommendations. Second, personalization is expensive. It requires data and expensive software for implementation. Whether personalization pays out ultimately depends on the accuracy of the personalization – did we recommend the right book to the right person? This cannot be taken for granted.<sup>5</sup>

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<sup>3</sup> "Personalized Marketing Software Overcomes Demand Generation Challenges in the Business-to-Consumer Marketplace," [http://www.12soft.com/Case\\_Portola.pdf](http://www.12soft.com/Case_Portola.pdf), Retrieved on Aug 09, 2007.

<sup>4</sup> Infoworld- December 13, 1999, Retrieved on Aug 9, 2007.

<sup>5</sup> E-week Business magazine- November 27, 2000, Retrieved on Aug 9, 2007.

## 2.2 Customization

Whereas Amazon serves as the prototypical example of personalization, Dell Computer plays that role for customization in the computer industry. The customer can order a computer from Dell according to his/her needs and likes. Thus the computer is custom-made for the user. The long-term pay-off of this strategy is difficult to determine, and confounded with Dell's reliance on the Internet channel, and its recent woes. However, it certainly appears that customization was part of the value proposition that propelled Dell into being a major player.

Customization has been applied in a variety of other industries. Many restaurants allow customers to suggest alterations to the stated menu. A recent study found that 81% of motorcyclists would like to have the motorcycle seats made-to-order. Sporting goods giant Adidas-Salomon has utilized customization (Berger and Piller 2003). Faced with intense competition to launch the right new products, Adidas has begun production of shoes which are 'co-designed' by the customer. A survey by Berger (Adidas) and Dr. Piller (TUM, Munich) has shown that customers prefer these shoes to the standard ones. Companies like 'Spreadshirt' and 'Levis'<sup>6</sup> also customize apparel. In consumer durables, 'IKEA' and 'Bemz Furniture'<sup>7</sup> have started a joint venture to provide custom made furniture. The 'BMW-Mini' is a very common car in Germany and now, it comes with a customized roof design too. One can design the roof of the car online and then the car is custom-made. Marelli Motors, responding to competition from new entrants, has decided to produce only custom-made electric motors.

Other examples abound. Banks such as Garanti Ban', Turkey and Deutsche Bank have begun to offer checkbooks and Credit Cards in any design that suites the customer. In the

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<sup>6</sup> Mass-Customization in Clothing, <http://www.mass-customization.de/case.htm>, retrieved on August 10, 2007.

<sup>7</sup> Mass- Customization and Open Innovation news, March 2006, [http://mass-customization.blogs.com/mass\\_customization\\_open\\_i/furniture\\_home/index.html](http://mass-customization.blogs.com/mass_customization_open_i/furniture_home/index.html), retrieved on August 09, 2007.

pharmaceutical industry, 'VURU' is a pill-box used to carry nutritional supplements in customized daily-packs. The customer is given the freedom to choose how he/she wants his box to look like and what it should contain. This product is already on the market and comes with all the details that are considered pertinent for the medicines inside.<sup>8</sup>

An obvious potential advantage of customization is greater customer satisfaction. While the proliferation of examples cited above implicitly bears testimony to this, the long-term impact and profitability of customization has not to our knowledge been analyzed systematically. Another potential advantage suggested by the above examples is strategic – we often see customization emerging in highly competitive industries – restaurants, banking, apparel, computers – where product differentiation is crucial but difficult to achieve. Customization itself is a point of differentiation (Dell) and moreover ensures the product itself is unique.

A potential disadvantage of course is cost. For example, the customized Adidas shoes are about 30% more costly than the standard line. Again, the question is whether the incremental volume and strategic advantages overcome this cost. Customization could also make the purchase decision difficult by making the choice task very complex. Huffman and Kahn (1998) and Dellaert and Stremersch (2005) demonstrate the psychological difficulty of trading off the higher utility derived from customized products with the complexity of making the choice. Another potential problem is the Pandora's Box of raising customer expectations. For example, the BMW mini customer may decide that he or she wants everything customized – from the interior to the hub caps. How does the customer react when BMW says, "Sorry, we can't allow you to customize everything?"

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<sup>8</sup> Service Customization- February 28, 2007, [http://mass-customization.blogs.com/mass\\_customization\\_open\\_i/service\\_customization/index.html](http://mass-customization.blogs.com/mass_customization_open_i/service_customization/index.html), retrieved on August 9, 2007.

### 2.3 Forces Shaping the Evolution of Personalization and Customization

The challenges in implementing personalization and customization will have to be met by future advances in three steps of delivering one-to-one marketing (Black and Thomas 2004): (1) collecting the data, (2) transforming the data into insights, and (3) operationalizing the results.

The key issue in collecting data is customer data integration – the collection of customer data at all “touch points.” There are two dimensions to this issue. First is the extent of integration (360-degree view being the ideal). Second is for how many customers the firm has the integrated data. Neslin et al. (2006) review this issue with respect to integration across sales channels and question whether it necessary to have 360-degree view for *all* the firm’s customers. A company may be able to obtain a 360-degree view easily for 40% of its customers because they are members of the company’s loyalty program. Obtaining such data for the next 60% may be prohibitively expensive. Perhaps the company can leverage the insights from the 40% sample to the 60%, although they are obviously not randomly generated samples.

This leads us to the second challenge – developing insights. Companies that perform the most sophisticated personalization and customization have strong capabilities in statistical modeling. Some of the sophisticated techniques that are used to analyze customer behavior are being standardized into computing packages like SAS and BUGS, and this software will have to become more accessible in the future. In addition, companies will have to learn how to analyze text data (Coussement and Van den Poel 2007) generated by customer emails, blogs, news groups, chat forums, and virtual communities. Coca Cola, Harley Davidson, and Disney have invested in learning from brand communities.

The final step, operationalization, requires close coordination among marketing, information technology, and production. The challenges can exceed the organization’s capabilities. This



suggests more “partnering” to bring about personalization and customization. One such example is ‘Land’s End’, a catalog retailer. The data for customizing jeans or shirts is collected at the Lands End website. But Land’s End relies on externally provided software to translate customer-specifications for jeans and shirts into final patterns that are then used to produce the clothing..

### 3. Empirical Challenges in Personalization

#### 3.1 The Issues

A distinguishing feature of personalization versus customization is its reliance on statistical analysis of customer data to predict customer response to prices, promotions, or communications. There are two key issues. First, how accurate are these predictions? Personalization relies on assigning the right marketing effort to the right customer. But if the cost of misclassification is large, the firm may be better off not personalizing. For example, distracting and annoying the customer by recommending a series of books in which he or she has no interest may be worse than making no recommendation at all. The second issue is how far the firm should go toward the ultimate goal of one-to-*one* marketing? Figure 2 depicts the choices available to the firm. It may be that the loss in “precision” in going 1-to-n may be worth avoiding the errors of misclassification in going 1-to-1.

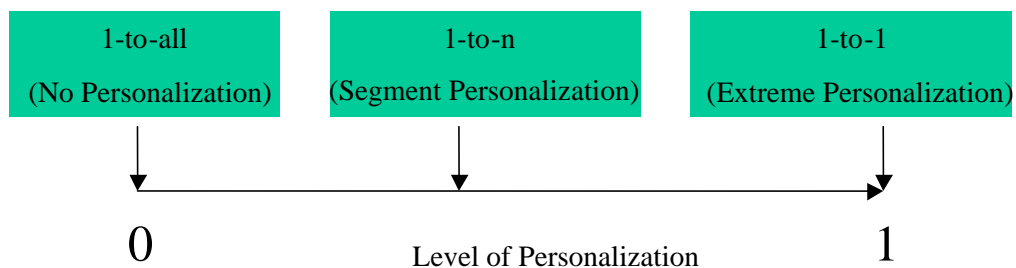


Figure 2: Firm Choice on Level of Personalization

### 3.2 What We Know

The research on these issues can be classified into two categories: supportive and doubtful. Among the supportive research, Rossi, McCulloch and Allenby (1996) first quantified the benefits of adopting one-to-one pricing by utilizing household purchase history data and empirically found that individual personalization improves 7.6% over mass optimization. Later, Ansari and Mela (2003) found that the content-targeting approach can potentially increase the expected number of click-through by 62%. Furthermore, Arora and Henderson (2007) showed customization at individual level can enhance the efficiency of embedded premium.

Among the doubtful stream of research, Zhang and Wedel (2007) investigate the profit potential of various promotion programs customized at different levels in online and offline stores. The three levels of customization are (1) mass market (1-to-all) – each customer receives the same coupon, (2) segment (1-to-n) – each member of the same customer segment receives the same coupon, and (3) individual (1-to-1) – each customer receives an individualized coupon. They found the incremental benefits of 1-to-1 promotions over segment- and market-level customized promotions were small in general, especially in offline stores. Note, it is possible that 1-to-1 promotions may significantly increase response rates, perhaps due to steeper discounts, but that may not translate into significant profit increases.

### 3.3 What We Need to Know / Future Research

It is not resolved whether traditional consumer choice models can be used successfully to personalize the marketing mix. We need to know what methods predict most accurately. There are two directions to go here – more complex or simpler. On one hand, complex machine learning algorithms (e.g., see Blattberg, Kim, and Neslin 2008) might be required. Or, given the

data limitations and specification issues that can wreak havoc with complex models, simple models such as RFM may be the best way to go. RFM stands for Recency-Frequency-Monetary Value, and uses information about a customer's most recent purchase, her frequency of purchase and the dollar value of her past purchase to predict her likelihood of purchasing a product in the future. This can be done on an individual customer basis and can therefore be used to provide personalized recommendations of future product purchases. Regarding level of personalization, Malthouse and Elsner (2006) provide encouraging support for 1-to-n personalization (using relatively simple statistical analysis). This support is in the form of a field test, which should be the litmus test for research in this area.

More broadly speaking, we need decision support systems for weighing the costs of incorrect personalization and helping managers decide when to personalize, and to whom.

#### **4. Economic Models of Firm Choice Related to Personalized Pricing**

##### **4.1 Key Results in Literature**

From an economic standpoint, the promise of personalization is to enable firms to estimate their customers' valuations and, hence, implement finer price discrimination. A number of theoretical papers (Shaffer and Zhang 1995, Bester and Petrakis 1996, Fudenberg and Tirole 2000) have shown that, among equally-matched (symmetric) firms, offering personalized pricing, while being optimal for each practicing firm, makes all firms worse-off. Choudhary et al. (2005) examine a vertically differentiated duopoly and show the higher quality firm can be worse-off with personalized pricing.

Of course, in reality, competing firms are rarely equally matched. For instance, firms may differ in terms of how many loyal customers they each may have and hence their targeting

strategies may differ in terms of offering discounts to own vs. the rival's customers. In that case, Shaffer and Zhang (2000) show that personalized pricing can alleviate price competition and benefit firms (earn higher profits in equilibrium). In a more general model, Shaffer and Zhang (2002) consider both horizontal and vertical differentiation, with a positive cost of targeting customers. They show that the firm with more loyal customers can earn higher profits in equilibrium when both firms engage in one-to-one promotions. Ghose and Huang (2007) allow symmetric firms to offer a continuum of qualities and show firms can avoid a Prisoner's dilemma and are better off when they engage in one-to-one pricing. This happens because firms can provide higher qualities to each consumer without the fear of intra-firm product cannibalization.

When we look at personalization in the presence of strategic consumers, the results once again paint a complex picture. Villas-Boas (2006) shows that a monopolist is worse-off by offering one-to-one promotions, because 'strategic consumers' can sacrifice their purchase in the first period so that they are not identified as existing customers in the next period. However, Chen and Zhang (2007) show that targeted pricing is profitable, in the presence of strategic customers, only in a competitive setting.

Allowing consumers to haggle is another mechanism by which firms can personalize pricing. When costs of haggling is heterogeneous, Desai and Purohit (2002) show firms may find it profitable to allow consumers to haggle than follow fixed price policy.

The above papers assume perfect information, that the firm has a perfect predictive model (a debatable assumption as we discussed earlier). Chen, Narasimhan & Zhang (2001) show, perhaps paradoxically, that mistargeting softens price competition because firms fear offering low prices to the wrong customers. Liu and Serfes (2004) also consider imperfect information in a spatial price discrimination model and find that firms unilaterally commit not to price

discriminate when the quality of information is low.

Another important issue associated with personalized pricing is whether firms should engage in first degree or second degree price discrimination when customizing their products. Ulph and Vulkan (2001) use the Hotelling framework to study this relationship in a duopoly and show that a firm is always better off using first-degree price discrimination if it also mass-customizes and vice versa.

A critical issue the cost of personalization also plays an important role in the decisions being made by firms. Dewan et al. (1999) show that as the cost of personalization decreases, firms provide more and more personalized products compared to standardized products when they can employ second degree price discrimination whereas Chen and Iyer (2002) show that firms will invest in personalization if customers are sufficiently heterogeneous and the cost of personalization is high which again requires understanding of context where one prediction is more robust than the other one and vice versa.

#### 4.2 Future research

While we have generated important theoretical insights regarding personalized pricing, there still are a number of unanswered questions. How does the growth rate of any market impact firms' personalization strategies? Are there synergies between personalization and branding? Currently, firms have a lot of information about their existing customers but not about competitor's customers. There needs to be further research on conditions under which sharing information with competitors can be profitable (see Chen et al. 2001). Although a few empirical papers (e.g. Ansari and Mela 2003) have examined the role of personalized communication in reducing information overload and aiding customer decisions, this also remains a fruitful area for future theoretical research. Further research is also needed to understand firm strategies when

firms have different cost functions arising due to operational efficiencies enjoyed by a firm. Another area is the role of personalization when firms adopt non-linear pricing schedules.

## **5. Firm Choice in Product Customization**

### **5.1 Product Proliferation vs. Product Customization**

A familiar presumption in marketing is that a consumer realizes higher utility when the product better matches her ideal preference. Therefore, when costs to achieve this match are sufficiently low, firms with some monopolistic power may reap higher profits by providing better-matching products. Product customization and product proliferation are two popular strategies for improving the preference-product match, with some firms actively pursuing both. A firm pursuing product customization first invites each individual consumer to reveal her preference and then produces and delivers a product with the closest match possible. A firm pursuing product proliferation does not hold such one-to-one dialogues with consumers. Instead, it offers many variants and the customer chooses the most appealing product. Product proliferation is observed in many markets such as breakfast cereal, yogurt, toys, apparel, books, and consumer electronics.

### **5.2 Customization, Competition and Firm Profitability**

Although customized products increase consumer utility, firms do not always gain from adopting mass customization, frequently because customization reduces product differentiation in a competitive context. In fact, if two or more firms offer a consumer the product that perfectly addresses her taste, then Bertrand competition will drive prices down to the second-highest marginal cost (Lederer and Hurter 1986; Thisse and Vives 1988). Nevertheless, if a firm does not pursue customization but its competitors do, then the former would probably become worse off.

In many product categories today, the technological ingredients underlying product customization are relatively mature and readily accessible to all firms. This implies that adopting customization can not ensure competitive advantage and indeed, studies have shown that pursuing customization may lead to a Prisoner's Dilemma (Dewan et al 2003; Thisse and Vives 1988).

So, will customizing firms ever be able to escape the curse of Prisoner's Dilemma? The answer is yes. As Dewan et al (2003) further show, when firms differ in the timing of adopting customization, the early adopter may achieve a first-mover advantage. Such first-mover advantage can be sustained if there are salient learning-curve effects and/or scale economies. It is mainly for such reasons that Dell Computers, the first to offer customized PCs on the Internet, maintains its industry leadership today. Amazon.com invented the book recommendation system based on collaborative filtering. Due to the inherent scale economies in collaborative filtering, Amazon is widely believed to provide more relevant recommendations than its competitors.<sup>9</sup>

If the product has multiple attributes of keen interest to consumers, then the firms may relax price rivalry by judiciously choosing which attribute(s) to customize (Syam et al 2005). In a two-dimensional spatial model, a surprising insight of Syam et al (2005) is that the competing firms may choose to customize an identical attribute but not both attributes, achieving "matched partial customization". In a model of both horizontal and vertical differentiation, Ghose and Huang (2006) investigate a duopoly where one or both firms tailor both its prices and product qualities based on consumers' willingness to pay. They also show that a Prisoner's Dilemma situation does not arise even when the firms are ex ante symmetric.

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<sup>9</sup> Collaborative filtering uses transaction data of related previous purchases as input and, all else equal, more transaction records render more relevant recommendations.

## 5.4 Constraints and Challenges in Mass Customization

Generally, it is economically viable for firms to tailor those attributes most valued by consumers and yet not too costly to customize. Currently, firms in many industries (e.g., apparels, cars, and computers) customize only a fraction of the product attributes and allow limited options for each of these attributes. However, technological advances may lower these costs. We might then be left with the prisoner's dilemma of all firms customizing on "all" attributes. For instance, many apparel makers are very happy to accommodate customers' request regarding size, color or fabric, but are reluctant to alter their basic styles due to concerns of compromising their brands. Customization can even prove harmful for status goods, because an objective of such goods is to project an image of exclusivity (Amaldoss and Jain 2005). Syam and Kumar (2006) show that, in competing exclusively with customized products firms may lose all differentiation advantages, and they may therefore not want to eliminate their standard products.

Branding (Keller 2001) may become more important in a customization environment. Companies may have to rely more on the rich associations and experiences consumers have with brands, rather than product attribute differences *per se*.

## **6. Consumer Perspectives**

### 6.1 Preference Formation

Substantial research shows that consumers often construct their preferences "on-the-fly" as a function of task and contextual characteristics—including the ease with which attributes can be evaluated (Hsee 1996), information format (e.g., Bettman, Luce, and Payne 1998; Jarvenpaa 1989; Payne, Bettman, and Johnson 1992), response mode (e.g., Slovic 1995), the particular



attributes used to recommend products (Häubl and Murray 2003), and the particular alternatives available for consideration at a given time (Bettman, Luce, and Payne 1998; Simonson and Tversky 1992). In other words, instead of being exogenous, preferences are in fact endogenous to the particular task and information environment facing the consumer.

These findings question two important assumptions of product personalization and customization (Simonson 2005). The first assumption is that consumer preferences are stable or evolve in a predictable fashion. Preference stability is critical for personalization because previous choices are used to predict future choices. Preferences are likely to be more stable when the information environment itself does not change, and when consumers have made repeated choices in a product category (Hoeffler and Ariely 1999). To the extent that the Internet allows consumers to learn from the product experiences and social information of other similar consumers (Chevalier and Mayzlin 2006; Forman, Ghose, and Wiesenfeld 2006), this should also enhance preference stability, allowing personalization.

The second assumption is that preferences revealed by consumer choices truly maximize utility. Suppose a customer heavily weights price in her product choices. The typical inference is that the customer has high price sensitivity. Another possibility, however, is that product information was presented in a way that made price comparisons easy and this accentuated the importance of price (Lynch and Ariely 2000). Similar effects may occur from using Internet-based shopbots that facilitate price comparisons (Iyer and Pazgal 2003). Thus, if prior choices are to be used to personalize product offers, care must be taken in designing the offer to mirror the environment under which the data driving the personalization were obtained.

The danger for product customization is that customers may realize after designing their “ideal” product that their actual preferences correspond more closely to standardized products

(Syam, Krishnamurthy, and Hess 2007). Customer uncertainty about their preferences is less likely to be an issue in business-to-business settings, where buyers have greater experience and expertise (Alba and Hutchinson 1987; Huffman and Kahn 1998). To the extent that a market is characterized by dramatic changes in market offerings, however, even experienced buyers may not know—or may be overconfident in—their preferences. One way to reduce preference uncertainty is to provide buyers with interactive tools that allow them to visualize and experience customized products prior to purchase (Lurie and Mason 2007) or to learn from the experiences of others (Chevalier and Mayzlin 2006; Forman, Ghose, and Wiesenfeld 2006). Additional research is needed to examine the extent to which such Internet-based tools reduce uncertainty.

## 6.2 Information Search and Processing

One of the greatest challenges to implementing customization is the extent to which consumers are willing and able to process and act on all the attribute options (Huffman and Kahn 1998). Information overload may lead to poor quality choices or a failure to purchase (Huffman and Kahn 1998; Iyengar and Lepper 2000; Lurie 2004). As the number of potential alternatives can be the factorial product of the number of attributes, having consumers choose among menus of attributes can reduce perceived choice complexity and increase satisfaction with choices processes and outcomes (Huffman and Kahn 1998). Other research suggests that menu based choice can allow firms to assess consumer preferences for a larger number of potential products than traditional conjoint approaches (Liechty, Ramaswamy, and Cohen 2001). Moreover, menus of product attributes can be personalized, (i.e., firms can offer different menus of attribute levels to different customers). This suggests a promising personalization/customization hybrid model.

Whether for economic, technological, or information overload reasons, product

customization will typically only be available for a subset of attributes. As a result, consumers will be presented with a default product that can be modified. Research suggests in such cases that consumers are likely to stick with the default (Johnson, Bellman, and Lohse 2002; Samuelson and Richard 1988). If the default is chosen with the consumer's interest in mind, for example automatically setting aside money for retirement unless the consumer opts out, there can be significant welfare advantages (Johnson and Goldstein 2007; Thaler and Benartzi 2004). Also, Hsee and Leclerc (1998) suggest it may be more profitable to offer consumers a single product because offering multiple options may lead to perceived losses in consumers' minds.

Finally, research on cognitive lock in (Johnson, Bellman, and Lohse 2003; Zauberaman 2003) suggests that there may be advantages to engaging the consumer in customization. Getting consumers to provide attribute importance weights which are used to create customized recommendations can reduce consumer effort and therefore increase loyalty (Häubl et al. 2004).

### 6.3 Consumer Acceptance of Product Customization

Although one-to-one marketing should increase satisfaction, there are situations in which consumers may prefer standardized products. Consumers with collectivist, as opposed to individualist, orientation react more positively to products that meet group, as opposed to individual, preferences (Kramer, Spolter-Weisfeld, and Thakkar 2007). Because preferences are labile, customers may be as satisfied with products that seem customized even if differences from standardized products are minimal (Simonson 2005). There is evidence that although recommendations for superior options increase choice satisfaction and confidence, recommendations that go against consumers' initial preferences can have the reverse effect (Fitzsimons and Lehmann 2004). Research also suggests that consumer acceptance of personalized offers depends on the ease with which consumers can see how recommendations

were developed (Kramer 2007).

Although personalized products may be appreciated by consumers, personalized prices may not be, particularly if such prices are seen as unfair. Prices are most likely to be viewed as unfair when consumers can see that they are paying a premium relative to others for a similar product (Xia, Monroe, and Cox 2004). For example, Anderson and Simester (2007) find that charging more for large size clothing in a catalog leads to significant declines in sales and profits. To the extent that personalized pricing is unlikely to reveal price premiums, since each customer only sees one offer, such approaches may be successful. However, there is risk here, as Amazon learned when it suffered a severe backlash for charging different prices for the same DVD to different customers (Morneau 2000). If price offers are based on purchase history, then other aspects of the offer should also be personalized to minimize comparisons on the basis of price alone (Xia, Monroe, and Cox 2004). Other research suggests that price *customization* (e.g., through negotiation) is less likely to be seen as unfair since consumers participate in price setting (Haws and Bearden 2006). On the other hand, personalized pricing through the distribution of coupons or customized emails are becoming increasingly common (Tezinde et al. 2002).

#### 6.4 Translating Attributes into Benefits

The benefits provided by a collection of attributes are often in the *interaction* of these attributes (Randall, Terwiesch, and Ulrich 2007). This increases the information-processing burden for customers. Novice consumers may be less able to customize their own products (Sujan 1985). For such consumers, specifying the relative importance of product benefits (such as performance and data storage in the case of a personal computer), rather than selecting preferred product features (such as processor speed and hard drive size) increases the perceived fit of the customized product offering (Randall, Terwiesch, and Ulrich 2007). At the same time,

as expertise increases, greater benefits are perceived from interfaces that allow the buyer to specify product features. Internet-based opinion sites and review forums can go a long way in helping consumers translate attributes into benefits.

### 6.5 Future research

The customer is central to one-on-one marketing much more than is the case in traditional mass marketing. Therefore it is important to understand the different aspects of consumer behaviors as they pertain to customization. While some research has addressed these questions, much more remains to be done. To what extent will the need-for-uniqueness help the movement towards customized products? Will the consumers' desire to seek comfort in familiar products detract from the widespread adoption of customized products? Clearly this will depend on the product category and the way consumers make decisions for different types of products. How do consumers deal with the risk that manufacturers will not be able to precisely customize according to their specifications? More research should address these and other questions.

## **7. Summary and Conclusions**

This paper has reviewed two major forms of one-to-one marketing – personalization and customization – and identified areas for future research. We started with an overview of one-to-one marketing in practice, and structured our discussion from the perspectives of empirical work, economic analysis, and psychology. Each of these perspectives yields its own “wish list” for future research. We conclude by synthesizing a few issues that draw on all three disciplines:

- *When should the firm engage in one-to-one marketing?* Traditional concepts in economics, such as price discrimination, and in psychology, such as information processing, have long supported tailoring the marketing mix to each consumer. But why is one-to-one such a recent phenomenon? It may be that advances in the data analysis and technology opened the door.

But undoubtedly there are other conditions under which one-to-one marketing is advisable.

- *When should the firm embrace personalization as opposed to customization?* Clearly, data plays a key role, as personalization is only possible if reliable and projectable customer data are available. However, economic and psychological analyses that pit customization versus personalization are needed.
- *Which elements of the marketing mix should be personalized or customized?* It may be that price should be personalized and product should be customized, but what conditions favor one form over the other? Consumer response – choice – plays a key role here.
- *To what degree should the firm personalize?* Should personalization be at the individual level, the segment level, or somewhere in-between? This surely is a statistical issue in terms of how accurately we can predict consumer choice, but undoubtedly there are economic and psychological factors as well.
- *How far should the firm go in customization?* Should the firm allow the customer to customize 10%, 50%, 90%, or the product? This depends on competitive issues, but also on the customer's ability to choose, i.e. fully design, his or her products.
- *How can we combine personalization and customization?* One way we mentioned was to personalize the product to some extent, e.g., suggest a certain style of apparel, but then have the customer customize the specifics. Where should we draw the line between personalization and customization?
- *Can personalization or customization be a source of competitive advantage?* It would appear that the ability to predict customer choices accurately could be sustainable and lead to a long-term advantage in personalization. We discussed economic forces that could draw firms into a prisoner's dilemma in customization if the critical features of a product become

customizable cheaply and customers are capable of defining their needs. Perhaps there is a way firms can differentiate themselves in their expertise in various aspects of the customer choice process, such as information processing or alternative evaluation, which can lead to sustainable advantages and higher industry profits.

Clearly, personalization and customization present many challenging questions for academics, and ultimately practitioners. Our review suggests that some important advances have been made, but clearly more contributions are needed from economics, psychology, and statistical analysis. We hope this paper will help guide these future endeavors.

## References

1. Alba, Joseph W. and J. Wesley Hutchinson (1987), "Dimensions of Consumer Expertise," *Journal of Consumer Research*, 13 (March), 411-54.
2. Amaldoss, Wilfred, Sanjay Jain (2005), "Pricing Of Conspicuous Goods: A Competitive Analysis of Social Effects," *Journal of Marketing Research*, 42:1, 2005, 30-42.
3. Anderson, Eric and Duncan Simester (2007), "Does Demand Fall When Customers Perceive That Prices Are Unfair: The Case of Premium Pricing for Large Sizes," *Marketing Science*, 26 (Forthcoming).
4. Ansari, Asim, and Carl F. Mela (2003), "E-Customization," *Journal of Marketing Research*, 40 (2), 131-145.
5. Arora, Neeraj, and Ty Henderson (2007), "Embedded Premium Promotion: Why it Works and How to Make it More Effective," forthcoming *Marketing Science*.
6. Berger Christoph and Frank Piller(2003) "Customers as Co-designers'," *IEE Manufacturing Engineer* (August- September), 42-45
7. Bester, H., E. Petrakis (1996), "Coupons and Oligopolistic Price Discrimination" *International Journal of Industrial Organization*, 14, 227-242.
8. Bettman, James R., Mary Frances Luce, and John W. Payne (1998), "Constructive Consumer Choice Processes," *Journal of Consumer Research*, 25 (3), 187-217.
9. Black, Alexander J. and Jacquelyn S. Thomas (2004), "Customer Intelligence is the Catalyst for Competitive Differentiation," white paper, [www.csc.com/solutions/customerrelation/shipmanagement/](http://www.csc.com/solutions/customerrelation/shipmanagement/)
10. Blattberg, Robert C., Byung-Do Kim, and Scott A. Neslin (2008), *Database Marketing: Analyzing and Managing Customers* (forthcoming), New York: Springer.
11. Chen, Y., C. Narasimhan, J. Zhang (2001), "Individual Marketing With Imperfect Targetability," *Marketing Science* 20(1) 23-41.
12. Chen, Y., J. Z. Zhang (2007) Dynamic Targeted Pricing with Strategic Consumers," Working paper, Wharton School, University of Pennsylvania, Philadelphia, PA.
13. Chen, Y., G. Iyer (2002), "Consumer Addressability and Customized Pricing," *Marketing Science*, 21(2) 197-208.
14. Chevalier, Judith A. and Dina Mayzlin (2006), "The Effect of Word of Mouth on Sales: Online Book Reviews," *Journal of Marketing Research*, 43 (August), 345-54.
15. Choudhary, V., A. Ghose, T. Mukhopadhyay, U. Rajan (2005), "Personalized Pricing and Quality Differentiation," *Management Science* 51(7) 1120-1130.
16. Coussement, K., Van den Poel, D. (2007b). Improving Customer Churn Prediction Using Emotionality Indicators in Emails as Additional Features, Working Paper. Ghent, Belgium: Faculty of Economics and Business
17. Dellaert, Benedict G. C. and S. Stremersch (2005), "Marketing Mass-Customized Products: Striking a Balance Between Utility and Complexity," *Journal of Marketing Research*, XLII (May), 219-227.
18. Desai, P. S. D. Purohit (2002), "Let Me Talk To My Manager: The Costs and Benefits of Hagglng," *Marketing Science*, 23(2), 219-233.
19. Dewan, R., B. Jing, A. Seidmann (1999) One-to-one marketing on the Internet. Proceedings 20th International Conference on Information Systems , 93-102.
20. Dewan, Rajiv, Bing Jing, Abraham Seidmann (2003), "Product Customization and Price Competition on the Internet," *Management Science*, 49:8, 1055-1070.
21. Fitzsimons, Gavan J. and Donald R. Lehmann (2004), "Reactance to Recommendations: When Unsolicited Advice Yields Contrary Responses," *Marketing Science*, 23, 82-94.
22. Forman, Chris, Anindya Ghose, and Batia Wiesenfeld (2006), "Examining the Relationship between Reviews and Sales: The Role of Social Information in Electronic Markets," NYU CeDER Working Paper #06-09.
23. Fudenberg, G., J. Tirole (2000), "Customer Poaching and Brand Switching," *RAND Journal of*



- Economics*, 31 634–657.
24. Ghose, Anindya, Ke-Wei Huang, Personalized pricing and quality design, 2006, Working Paper, New York University, New York, NY.
  25. Häubl, Gerald and Kyle B. Murray (2003), “Preference Construction and Persistence in Digital Marketplaces: The Role of Electronic Recommendation Agents,” *Journal of Consumer Psychology*, 13 (1), 75-91.
  26. Häubl, Gerald, Benedict G. C. Dellaert, Kyle B. Murray, and Valerie Trifts (2004), “Buyer Behavior in Personalized Shopping Environments,” in Human-Computer Interaction Series: Designing Personalized User Experiences in Ecommerce, Clare-Marie Karat, Jan O. Blom, and John Karat, eds. Vol. 5. AA Dordrecht, The Netherlands: Kluwer, 207–29.
  27. Haws, Kelly L. and William O. Bearden (2006), “Dynamic Pricing and Consumer Fairness Perceptions,” *Journal of Consumer Research*, 33 (December), 304-11.
  28. Hoeffler, Steve and Dan Ariely (1999), “Constructing Stable Preferences: A Look into Dimensions of Experience and Their Impact on Preference Stability,” *Journal of Consumer Psychology*, 8 (2), 113-39.
  29. Hsee, Christopher K (1996), “The Evaluability Hypothesis: An Explanation for Preference Reversals between Joint and Separate Evaluations of Alternatives,” *Organizational Behavior and Human Decision Processes*, 67 (3), 247-57.
  30. Hsee, Christopher K. and France Leclerc (1998), “Will Products Look More Attractive When Presented Separately or Together?” *Journal of Consumer Research*, 25 (2), 175-86.
  31. Huffman, Cynthia and Barbara E. Kahn (1998), “Variety for Sale: Mass Customization or Mass Confusion?” *Journal of Retailing*, 74 (4), 491-513.
  32. Iyengar, Sheena S. and Mark R. Lepper (2000), “When Choice Is Demotivating: Can One Desire Too Much of a Good Thing?” *Journal of Personality and Social Psychology*, 79 (6), 995-1006.
  33. Iyer, Ganesh and Amit Pazgal (2003), “Internet Shopping Agents: Virtual Co-Location and Competition,” *Marketing Science*, 22 (1), 85-106.
  34. Jarvenpaa, Sirkka L (1989), “The Effect of Task Demands and Graphical Format on Information Processing Strategies,” *Management Science*, 35 (3), 285-303.
  35. Johnson, Eric J. and Daniel Goldstein (2007), “Do Defaults Save Lives,” *Science*, 302 (5649), 1338-39.
  36. Johnson, Eric J., Steven Bellman, and Gerald L. Lohse (2002), “Defaults, Framing and Privacy: Why Opting in-Opting Out,” *Marketing Letters*, 13 (1), 5-15.
  37. Keller, Kevin Lane (2001), “Building Customer-Based Brand Equity,” *Marketing Management*, 10 (2), 14-19.
  38. Kramer, Thomas (2007), “The Effect of Measurement Task Transparency on Preference Construction and Evaluations of Personalized Recommendations,” *Journal of Marketing Research*, 44 (May), 224-33.
  39. Kramer, Thomas, Suri Spolter-Weisfeld, and Maneesh Thakkar (2007), “The Effect of Cultural Orientation on Consumer Responses to Personalization,” *Marketing Science*, 26 (2), 246-58.
  40. Lederer, P. and A. P. Hurter, Jr (1986), "Competition of Firms: Discriminatory Pricing and Location," *Econometrica*, 54, 3, 623-640.
  41. Liechty, John, Venkatram Ramaswamy, and Steven H. Cohen (2001), “Choice Menus for Mass Customization: An Experimental Approach for Analyzing Customer Demand with an Application to a Web-Based Information Service,” *Journal of Marketing Research*, 38 (2), 183-96.
  42. Linden, G., Smith, B., York, J. (2003). Amazon.com Recommendation: Item-to-Item Collaborative Filtering. *IEEE Internet Computing*, 7(1), 76-80.
  43. Liu, Q., K. Serfes (2004) Quality of Information and Oligopolistic Price Discrimination. *Journal of Economics & Management Strategy*, 13, 671-702.
  44. Liu, Y. and Z. J. Zhang (2006) “Research Note: The Benefits of Personalized Pricing in a Channel,” *Marketing Science*, 25, 97-105.
  45. Lurie, Nicholas (2004), “Decision Making in Information-Rich Environments: The Role of

- Information Structure,” *Journal of Consumer Research*, 30 (March), 473-86.
46. Lurie, Nicholas H. and Charlotte H. Mason (2007), “Visual Representation: Implications for Decision Making,” *Journal of Marketing*, 71 (January), 160-77.
  47. Lynch, John G. and Dan Ariely (2000), “Wine Online: Search Costs Affect Competition on Price, Quality, and Distribution,” *Marketing Science*, 19 (Winter), 83-103.
  48. Malthouse, Edward C., and Ralf Elsner (2006), “Customisation with Cross-Basis Sub-Segmentation,” *Database Marketing & Customer Strategy Management*, 14 (1), 40-50.
  49. Morneau, Jill (2000), “Dynamic Pricing: Who Really Wins?” TechWeb September 29.
  50. Murthi, B.P.S., Sumit Sarkar (2003), “The Role of the Management Sciences in Research on Personalization,” *Management Science*, 49(10), October, 1344-1362.
  51. Neslin, S.A., Grewal, D. Leghorn, R., Shankar, V., Teerling, M.L., Thomas J.S., Verhoef, P.C. (2006b). Challenges and Opportunities in Multichannel Customer Management. *Journal of Service Research*, 9(2), 95-112.
  52. Nunes, P. F., A. Kambil (2001), “Personalization? No Thanks,” *Harvard Business Review*. **79(4)** 32-34.
  53. Payne, John W., James R. Bettman, and Eric J. Johnson (1992), “Behavioral Decision Research: A Constructive Processing Perspective,” *Annual Review of Psychology*, 43, 87-131.
  54. Peppers, Don, and Martha Rogers (1997), *The One to One Future*, New York: Doubleday.
  55. Peppers, D., M. Rogers, B. Dorf (1999), “Is Your Company Ready for One To One Marketing?” *Harvard Business Review*, **77(1)** 151-160.
  56. Randall, Taylor, Christian Terwiesch, and Karl T. Ulrich (2007), “User Design of Customized Products,” *Marketing Science*, 26 (March-April), 268-80.
  57. Rossi, Peter E., Robert E. McCulloch, and Greg M. Allenby (1996), “The Value of Purchase History Data in Target Marketing,” *Marketing Science*, 15 (4), 321-340.
  58. Samuelson, William and Zeckhauser Richard (1988), “Status Quo Bias in Decision Making,” *Journal of Risk and Uncertainty*, 1 (1), 7-59.
  59. Shaffer, G., Z. J. Zhang (2000), “Pay To Switch or Pay To Stay: Preference Based Price Discrimination in Markets With Switching Costs,” *Journal of Economics Management Strategy*, 9, 397-424.
  60. Shaffer, G., Z. J. Zhang (2002), “Competitive One-To-One Promotions” *Management Science*, 48(9), 1143-1160.
  61. Shaffer, G., Z. J. Zhang (1995), “Competitive Coupon Targeting,” *Marketing Science*, 14 395-416.
  62. Simonson, Itamar (2005), “Determinants of Customers’ Responses to Customized Offers: Conceptual Framework and Research Propositions,” *Journal of Marketing*, 69 (January), 32-45.
  63. Simonson, Itamar and Amos Tversky (1992), “Choice in Context: Tradeoff Contrast and Extremeness Aversion,” *Journal of Marketing Research*, 29 (August), 281-95.
  64. Slovic, Paul (1995), “The Construction of Preferences,” *American Psychologist*, 50, 364-71.
  65. Sujana, Mita (1985), “Consumer Knowledge: Effects on Evaluation Strategies Mediating Consumer Judgments,” *Journal of Consumer Research*, 12 (June), 31-46.
  66. Syam, Niladri B., Ranran Ruan, and James D. Hess (2005), “Customized Products: A Competitive Analysis,” *Marketing Science*, 24 (4), 569-584.
  67. Syam, Niladri and Nanda Kumar (2006), “On Customized Goods, Standard Goods and Competition,” *Marketing Science*, 25 (5), 525-537.
  68. Syam, Niladri, Partha Krishnamurthy, and James D. Hess (2007), “That’s What I Thought I Wanted? Miswanting and Regret for a Standard Good in a Mass Customized World,” *Marketing Science* (Forthcoming).
  69. Tezinde, Tito, Brett Smith, and Jamie Murphy (2002), “Getting Permission: Exploring Factors Affecting Permission Marketing,” *Journal of Interactive Marketing*, 16(4), 28-36.
  70. Thaler, Richard H. and Shlomo Benartzi (2004), “Save More Tomorrow™: Using Behavioral Economics to Increase Employee Saving,” *Journal of Political Economy*, 112 (1), S164-S87.

71. Thisse, Jacques-Francois, Xavier Vives (1988), "On The Strategic Choice of Spatial Price Policy," *American Economic Review*, 78:1, 1988, 122-137.
72. Ulph, D., N. Vulkan (2001) Electronic commerce and competitive first-degree price discrimination. Technical report, University College London. <http://www.ecn.bris.ac.uk/www.ecnv/welcome.htm>.
73. Villas-Boas, M (2006), "Dynamic Competition with Experience Goods," *Journal of Economics and Management Strategy*, 15, 37-66.
74. Watson, H.J., Volomino, L. (2001). Harrah's High Payoff from Customer Information: Accessed August 7, 2007 <http://text.usg.edu:8080/tt/www.terry.uga.edu/~hwatson/> (Harrah's.doc).
75. Xia, Lan, Kent B. Monroe, and Jennifer L. Cox (2004), "The Price Is Unfair! A Conceptual Framework of Price Fairness Perceptions," *Journal of Marketing*, 68 (4), 1-15.
76. Zauberaman, Gal (2003), "The Intertemporal Dynamics of Consumer Lock-In," *Journal of Consumer Research*, 30 (December), 405-19.
77. Zhang, Jie, and Michel Wedel (2007), "The Effectiveness of Customized Promotions in Online and Offline Stores," working paper University of Maryland.