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Putting Yourself in the Picture: An Evaluation of Virtual Model Technology as an Online Shopping Tool

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The electronic gulf between shoppers and products makes evaluating a physical product on offer at an e-store a potentially problematic activity. We propose that the outcome of the product evaluation task is determined by the fit between the type of information provided and the type of information sought by the consumer and that this, in turn, influences a consumer's attitude toward an e-store. An experiment to compare the impact of one type of advanced evaluation support technology, the virtual model, with a more basic online catalog, is then described. Results indicate that virtual models are potentially valuable when a customer is concerned with self-image and considerably less valuable when concerned with functionality. In more general terms, variation in end-user attitudes toward the object of the task (evaluative attitude) influenced how informed consumers felt about a product when using different technologies. Feeling informed, in turn, had a strong effect on consumer attitudes toward the store. Our results highlight two important issues for online stores: (1) a consumer's information requirements depend on his or her attitude to a product rather than product attributes; and (2) meeting or not meeting these information requirements affects perceptions of the store. Business success in this context therefore appears to hinge on addressing the specific functional and image-related information needs of customers rather than simply providing more interactivity or technical functionality.

Key words: dual methods; e-store evaluation; electronic commerce; consumer attitude; virtual model; product information; empirical evaluation; value expressive; functional theory
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Introduction

The amount and variety of physical goods sold by online retailers worldwide continues to grow each year, with clothing and accessories the leading merchandise category ($12 billion) for e-sales within the United States in 2006, ahead of computer hardware ($9 billion) and home furnishings ($7 billion) (U.S. Census Bureau 2008). However, the substantial proportion of goods subsequently returned following an online purchase, estimated at 5.6% of online sales (Stock et al. 2006), is a major problem for retailers because of the complexity and cost of reverse logistics procedures. Return rates vary between industries: for example, returns are 5–10% for computer equipment and around 30% for clothing and accessories (Mulpuru 2008). In most cases, however, the goods were shipped correctly and are not defective; they are nevertheless returned because they do not meet key requirements. For example, size and aesthetics issues are believed to motivate most clothing returns (Regan 2001).

That the goods are generally not defective suggests that returns are merely the visible side of a much deeper problem with understanding product characteristics as they are described online. There is some evidence that the product attributes most relevant to individual consumers are frequently either not shown or not presented in a way that is relevant to the consumer (Forsythe and Shi 2003). It is therefore likely that many products are not purchased at all because customers do not feel comfortable with the evaluation support and therefore are not comfortable about moving past this evaluation phase.

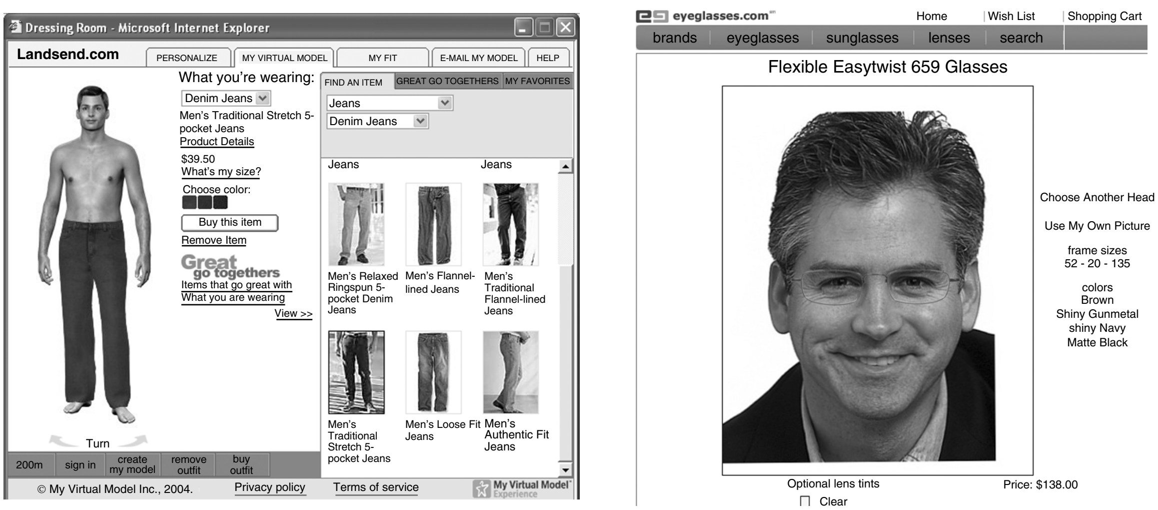
From the consumer's perspective, therefore, purchasing physical goods online appears to be most problematic in the evaluation stage of a transaction, where the suitability of a product is assessed. In essence, the electronic window, through which goods are examined and transactions conducted, does not allow shoppers to reach an informed understanding of the product, including knowledge of physical attributes, the fit with personal requirements, and the longer-term consequences of a purchase. This knowledge gap exposes the shopper to the so-called "adverse selection" or "lemon" problem (Akerlof 1970) and exposes the vendor to the costly reverse logistics activities associated with postsale returns of items and potentially lost sales if consumers lack confidence in the ability of the store to provide the information required. Some of these "evaluation failure" problems would be solved if shoppers could experience clothing physically (touch, wear, wash) before purchase, but this "solution" is, in general, neither feasible nor desirable in an e-commerce environment. It is therefore in the interests of both customer and vendor that the customer be able to gather appropriate information online.

In response to these problems, some online retailers have implemented systems that simulate some elements of a direct (in-person) shopping experience. Virtual model (VM) technology, illustrated in Figure 1, is perhaps the best publicized of these technologically intensive virtual inspection techniques. VM systems extend the virtual inspection concept by displaying the product in a more personalized context, allowing evaluation of the product in relation to the shopper's appearance. Lands' End and Speedo, for example, provide access to My Virtual Model, a third-party software product that lets customers build a virtual self and then try on virtual clothes in a virtual dressing room. Similarly, Eyeglasses.com (2007) and Framesdirect.com (2008) both provide a system that allows a customer to upload a digital photograph (face) to simulate trying on eyewear in front of a mirror. These systems are examples of Web-based applications that support learning through a self-discovery process that resembles the proximal (in-person) examination of products performed in physical stores. Clairol.com extends this idea by helping visitors to experiment with hair styles and colors (simulating postpurchase outcomes), as do cosmetic surgery simulators such as plastic designer (Nausoft 2007), which preview surgical procedure results.

Underlying these innovations appears to be an untested assumption that consumers will have more confidence in the evaluation process—and be more likely to purchase—when they can see themselves wearing (or using) the item, and an associated belief that informed customers are less likely to return products afterward (Beck 2005). This paper examines VM technology to assess whether consumers who use VMs while evaluating clothing and eyewear differ in their postevaluation perceptions to those who use a more traditional catalog-based system. The research question we examine is: compared to using a traditional catalog-style interface when evaluating a product, do customers who use a VM interface feel more

Figure 1 Examples of Virtual Models

Lands' End *My Virtual Model* | Eyeglasses.com *e Try It on* Model



Overview
Customer constructs an image by entering body measurements and attributes such as skin color and body shape. The model is then dressed and examined.

Note. Lands' End My Virtual Model was reprinted with permission of My Virtual Model. Microsoft product screen shot reprinted with permission from Microsoft Corporation.

Overview
Customer uploads a digital photograph of face. Images of eyewear are then superimposed on the photograph.

Note. The Eyeglasses.com virtual model was reprinted with permission of Eyeglasses.com. Microsoft product screen shot reprinted with permission from Microsoft Corporation.

informed, and does feeling informed lead to a more positive attitude toward the online store?

In posing that question, we question implicitly whether providing increasingly sophisticated technology is the best way to help customers assess products online. Relying on technology in this way reflects a widely held assumption that simply providing a more technologically sophisticated and interactive interface (such as virtual reality) will improve the online experience for shoppers. An alternative conceptualization is that online support is actually only effective to the extent that the type of information provided corresponds to the information sought by the consumer and that meeting these information needs is what influences the consumer's attitude toward the store. On this view, it is not so obvious that providing more support tools or increasing interactivity will lead to better outcomes. In fact, because different people can derive value from a product in quite different ways, many evaluative criteria may be used to assess a single item, each potentially requiring a different package of information (Blackwell et al. 2006, DeBono et al. 2003). This principle is evident in a study of product evaluation criteria (Creusen and Schoormans 2005), which found great variation among consumers in the importance of symbolic and functional product attributes when evaluating telephone answering machines. Those who regarded the machines as purely functional devices based their decision mainly on the descriptions of operational specifications, whereas people who valued a machine for its symbolic qualities (e.g., whether the design is "modern") relied on detailed photographs. In other words, even when all consumers were ostensibly carrying out the same task (evaluation) on the same products, information needs varied according to each consumer's attitude toward the items. Applying this alternative conceptualization to the online retail store context, we argue the following two points: (1) individual attitudes toward a product moderate the impact of technology on evaluation activities, and (2) the fit of information provided with that sought by the consumer affects a consumer's attitude toward the store.

It is worth comparing our theory to the task-based theories of fit commonly cited in information systems research: task-technology fit (Goodhue 1998) and cognitive fit (Vessey and Galletta 1991). Task-technology fit describes how fit between the capabilities of a technology and task characteristics affects technology utilization and task performance (with emphasis on administrative work in organizations). Cognitive fit explains how fit between task type and information display influences individual performance (speed and accuracy) in solving a problem. A common theme throughout both theories is that superior performance should occur if the design of the support technology matches the task requirements. Our theory, in contrast, holds that, even with the fixed task of product evaluation, systematic differences in attitude to the object of the task (the product) lead to users actively seeking different information, and that outcomes are determined by the fit between information provided and the information sought by the consumer.

To investigate these ideas, we conducted a controlled experiment in which participants assessed products online using either a VM or a more basic catalog. Specifically, participants used VM systems at two live e-stores—Lands' End and Eyeglasses.com—to evaluate four separate products. During the session, each participant completed a survey to provide quantitative data about responses, including questions about that person's evaluative attitude toward each product. This measure allowed us to assess whether product evaluation outcomes from each display were affected by the different information seeking emphasis that we theorized would be associated with each type of personal value. The survey data were complemented with recordings of verbal responses throughout each evaluation to allow in-depth assessment of information-seeking motivations and behaviors. Our use of live e-store Web pages is important methodologically because it counters any suggestion that the treatments are not representative of commercial systems. Moreover, the experiment has benefited from the development, testing, and maintenance efforts of numerous professional programmers working for the e-stores. Our approach is also novel: mixed methods and the use of live e-stores in experiments are unusual, as is our strong focus on the customer rather than just technology impacts.

Results indicate that evaluative attitude has a strong moderating effect on end-user perceptions. Specifically, people who had a value-expressive evaluative attitude toward a product felt more informed about that product when evaluating with the assistance of a VM. Conversely, people who had a utilitarian evaluative attitude felt most informed when evaluating with a catalog-style interface. The extent to which participants felt informed, in turn, influenced the perceived usefulness of the online store for shopping activities. Together, these findings indicate that, although helping customers to evaluate products affects attitudes toward a store, providing such support is not a simple matter of increasing media richness or interactivity. Instead, effective support of customer needs involves understanding the type of attitude each customer holds toward a product (utilitarian or value expressive), the evaluative process they will use given those attitudes, and the information that is appropriate to that evaluative process.

Theory

Feeling Informed as an Antecedent of Perceived Usefulness

Our first argument is that feeling informed about the products at an online store affects a consumer's attitude toward that store. This is premised on findings in consumer decision-making research that the level of self-assessed knowledge (which may not correspond to objective knowledge) influences decision behavior and a consumer's assessment of the vendor (Park and Lessig 1981). Specifically, consumers who feel less informed are less confident about making a decision and less satisfied with the assistance provided by the store (Haeubl and Trifts 2000). Ensuring that consumers have the right information is therefore important for any store, but particularly so if the store is the primary (or only) source of information about an item.

Product information, in this sense, includes: text, images, and sound that convey aesthetic, symbolic, and functional attributes (Creusen and Schoormans 2005); technical capabilities (Hargreaves et al. 1976); time-related issues (Jacoby et al. 1976); and conditional data such as task suitability (Bevan and MacLeod 1994). Feeling "informed" about a product therefore refers to a belief that one understands how these subjective and objective qualities affect the consequences of using, consuming, or owning a product. This includes an awareness of what will be purchased (physical attributes, quality), how a shopper's requirements will be met, and when benefits or problems can be expected. In other words, feeling informed means believing that you have some understanding of the product (e.g., quality), how it meets personal needs (the item-self relationship), and potential time-related (postpurchase) issues.

To establish a theoretical link between evaluation outcomes and attitudes toward the store, we must first describe the theoretical elements of the product evaluation process. Consumer decision-making literature has long held that a purchase is a series of interlinked information search and decision activities. For example, the Engel-Blackwell-Miniard model of the purchase process (Blackwell et al. 2006, Engel et al. 1968) describes seven types of shopping activity: recognize a need, search for solutions, evaluate alternatives, make purchase decision, consume product, decide whether to return to the store (and related postpurchase actions), and divest product.

Each phase is associated with specific psychological processes and has distinct "success" requirements; completing a phase successfully allows transition to the next, whereas not meeting requirements will result in postponement or abandonment of the process (Dhar and Nowlis 2004). In the context of this study, the evaluation phase is successful if the consumer is able to make an informed accept/reject decision for each solution offered. Not purchasing therefore does not represent a failure (it is unreasonable to expect that every visit to a store should generate a sale); rather, the outcome of the evaluation phase is a failure if the consumer is unable to make an informed decision. Taking a longer-term perspective, supporting evaluation is acutely important if the perceptions of the purchase process affect the likelihood of repeat visits (Jiang and Benbasat 2007b, Sismeiro and Bucklin 2004).

Understanding how each part of the purchase process affects a shopper's satisfaction with the store is particularly important for an online retailer, for whom all interaction occurs through the Web browser interface. Online retailers therefore need to develop a deep understanding of how the customer interface supports progress through each stage of the purchase process so that they can provide the type of assistance actually required in each phase (Chang and Burke 2007, Kohli et al. 2004). Unfortunately, e-commerce research into consumer decision making has to date focused almost exclusively on the search and purchase phases of the process and largely ignored the critical phase in which an item is evaluated and selected (Zeng and Reinartz 2003). Moreover, studies have commonly measured only outcomes that are valued by the vendor, such as the likelihood of a sale, rather than consumer-focused success measures.

Consumer satisfaction is a common success indicator in this context. It is generally operationalized by having the consumer rate the performance of the product or service relative to initial expectations (Wang and Wallendorf 2006). However, that view of satisfaction is incomplete. There are actually two main forms of consumer satisfaction: satisfaction with the item purchased (the consumption experience) and satisfaction with the purchase process. Each produces a different impact on postpurchase behavior. Consumption satisfaction is an indicator of whether postpurchase needs have been met. It is closely related to attitudes to the item and the brand and largely determines repurchase intentions (Oliver 1993). Satisfaction with the purchase process, in contrast, indicates the extent to which a consumer perceives that a retailer has met his or her needs throughout the purchase process, from the need-recognition phase though to the receipt of goods, and so influences attitudes toward the *store* rather than the item (Zeithaml et al. 1996). Because this research is concerned with the evaluation phase, our focus is on satisfaction with the process. However, to avoid confusion with the alternative usage of the term "satisfaction," we use the term "perceived usefulness of the store" to represent satisfaction with the assistance provided by an online store.

This more accurately captures the notion of process satisfaction.

The distinction between consumption and process satisfaction has its roots in attribution theory, which holds that a person who experiences a negative outcome will not just accept that it occurred, but will actively search for an underlying cause, and that the cause inferred will influence any subsequent response (Folkes 1984, 1988). Applied to the purchase process, failure in any phase will activate an attribution response, whereby blame will be attributed to the store (on the basis that the seller tends to be held responsible for transactional problems and the manufacturer is held responsible for product problems) and so impact on attitudes toward that store (Fitzsimons 2000). In other words, the more problematic the user experience while shopping, the more negative the consumer response to the vendor and the lower the perceived usefulness of the online store. Limiting consideration to the evaluation process leads to our first hypothesis: a consumer who believes that an online store assists in the information-gathering and analysis activities associated with product evaluation will perceive that store to be more useful.

Hypothesis 1. *The more informed a consumer feels about a product as a result of visiting an online store, the greater the consumer perceives the usefulness of that store to him or her.*

Evaluative Attitudes: Value-Expressive Versus Utilitarian Attitudes

We argued in the previous section that, for a consumer, success in the evaluation phase of a transaction means being sufficiently informed to make an accept/reject decision about each item under consideration. Next we need to consider factors that might lead to a given product description being perceived as more or less informative, because these factors are relevant to good website design. One might expect that this depends on the attributes of the product. However, considerable research suggests that a customer's beliefs about the product are paramount (see Blackwell et al. 2006). Marketing research elaborating on the functional theory of attitudes (Katz 1960) describes how each individual may have a value-expressive or utilitarian attitude to a product (Johar and Sirgy 1991, Snyder and DeBono 1985) and that, when assessing the benefits to be derived from acquiring it, each type of attitude is associated with a different value function. The value function is value expressive when the consumer believes that the product expresses information about his or her identity, values, or beliefs to other people (Shavitt 1992) and utilitarian when the product is seen as providing only functional or performance-related benefits.

Because of this difference in value attribution, each kind of attitude toward the product is also associated with a different evaluation emphasis. A value-expressive attitude will initiate a self-referential evaluation process in which the imagined stereotypical user of a product is compared with one's self-image (Katz 1960), and personal value will be assessed based on extrinsic qualities of the item (what it represents). The type of self-identity involved in this assessment may be the actual self (how you see yourself), an ideal self, the actual social self (how you think others see you), or an ideal social self (Johar and Sirgy 1991). The greater the match between the imagined stereotypical user and the specific self-identity used, the greater the personal value attached to the item.

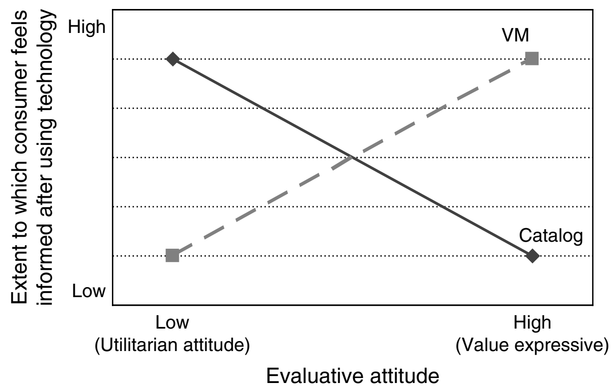
Conversely, when the evaluative attitude toward a product is utilitarian, evaluation involves a functional congruity process in which one's beliefs about performance-related characteristics designed into, or inherent in, an item are compared with a set of ideal attributes (Katz 1960). That is, utilitarian-oriented evaluation involves comparing beliefs about what a product *can* do with what it *should* do; personal value is derived from the item's intrinsic qualities (inherent capabilities).

Information requirements thus vary considerably according to whether a product is evaluated using a self-referential process or a functional congruity process. In the self-referential process, information-gathering activities focus on determining the extent to which an item's symbolic qualities are compatible with one's self-image. A product representation that emphasizes symbolic qualities should meet the information needs of that process. In a functional-congruity process, in contrast, performance attributes or utilitarian benefits will be assessed against requirements (Shavitt 1992); the corresponding information needs are likely to be satisfied by a functionally oriented product representation, such as a description of technical specifications or how the item can be used.

Park and Stoel (2000) report that most stores provide product descriptions that emphasize objective or technical data, such as color, fabric type, size, or washing advice, but lack details of aesthetics and other experiential issues. The description of a Men's No Iron Shirt at the Lands' End online store (Lands' End 2008) is typical of this style. That description uses functional terms such as "100% cotton Pinpoint fabric," "sharp creases at the sleeve pleats," and "stays wrinkle-free for at least 50 washes." Our theory predicts that this emphasis should be informative for consumers who have a utilitarian attitude toward that product (and so assess it in functional terms) and less informative where the attitude is value expressive.

The VMs shown in Figure 1, in contrast, are examples of self-image representations: using this technology, a customer can construct a digital self to reflect

Figure 2 **Hypothesized Interaction Model**



Note. Showing predicted effect for each hypothesis.

any desired self-image (desired, perceived, or actual self). Wearable goods can then be shown on the model to enable the customer to evaluate them in terms of the self-image values embodied in the model (similar to using a dressing-room mirror). Because a VM emphasizes image rather than function, our theory predicts that it will assist consumers who have a value-expressive attitude toward the product, but less when that attitude is utilitarian. These predicted relationships are illustrated in Figure 2: value-expressive evaluative attitudes (high score) are associated with consumers feeling informed when examining a product using the VM representation (dashed line), and utilitarian attitudes (low score) are associated with consumers feeling informed when the evaluation is conducted using only the catalog (solid line). This interaction hypothesis is expressed more formally:

Hypothesis 2. *Consumers who hold a more value-expressive* (*utilitarian*) *attitude toward a product will feel more* (*less*) *informed after evaluating the product using a VM and less* (*more*) *informed when the evaluation involves only a traditional catalog*.

Collectively, our hypotheses form the conceptual model shown in Figure 3; an individual's evaluative attitude toward a product (from utilitarian to value expressive) moderates the impact of the evaluation support technology used (the display type) on the extent to which a consumer feels informed. Feeling informed, in turn, results in a positive assessment of the perceived usefulness of the online store.

Research Method

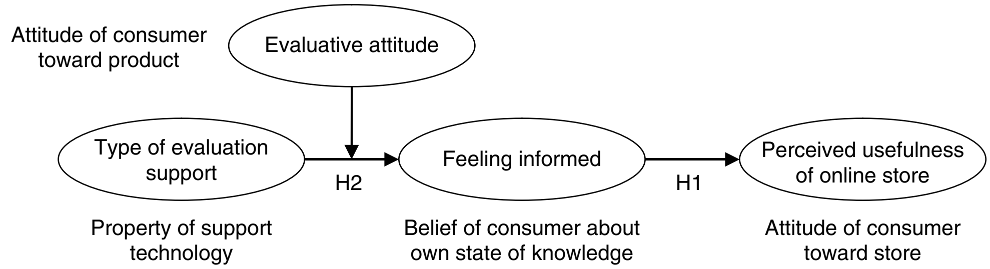
Scale Development

To test the model shown in Figure 3, operationalized measures of (1) the conceptual variables evaluative attitude (toward each product), (2) the extent that a consumer feels informed about a product, and (3) the perceived usefulness of the online store were therefore required. Each was validated with the Q methodology-based card-sorting technique used by Davis (1989) and often found in management information systems (MIS) studies (see Thomas and Watson 2002). Briefly, this process involved developing candidate measures from theoretical definitions, past research, and face-to-face interviews. The semantic content of each item (interitem similarity and compatibility with the construct definition) was then assessed using qualitative and quantitative data gathered in face-to-face interviews. Finally, a small-scale pilot study (20 data points) was conducted to fine-tune treatments and protocols and to assess participant understanding of each measure.

Feeling Informed. To operationalize our definition of feeling informed (a belief that, as a result of interacting with product data, a customer is aware of and understands the consequences of using, consuming, or owning the product), a new measure was required. Our theoretical position—that being informed is not a purely technical issue—meant that existing measures were unsuitable. These included technology-centered measures, such as the number of cues (Resnik and Stern 1977), measures assuming the presence of an objectively correct decision outcome (Speier et al. 2003), and high-level measures that assume that the extent to which a customer feels (or is objectively) informed is attributable solely to the information source or even the technology (Herr et al. 1991, Jiang and Benbasat 2007a).

Our theory holds that an individual's attitude toward a product determines his or her information requirements while evaluating that product.

Figure 3 **Research Model Showing Name of Each Construct (Ellipse), Nature of Each Construct (Callout Text), and Hypotheses**



Unfortunately, although many product attributes that are relevant for evaluation are identified in past research, there is little consistency among these studies. Some mention a single issue, for example, personal goal fulfillment (Steenkamp 1989) or how future risks are minimized (Kirmani and Rao 2000). Others list multiple types of information, for example, physical attributes and functionality, fitness for purpose, and future utility issues, such as durability (Nelson 1970), features, performance, and reliability (Garvin 1984).

Despite the variation, broad themes are evident in the product attributes. Some describe physical and functional properties of the product (e.g., dimensions), some are concerned with the personal utility of a product, and others deal with time-related information (postpurchase performance). Evaluation, therefore, involves assessing properties of a product, how these meet personal needs, and how it will change over time. These concepts are operationalized here in the *feeling informed* variable as *item* (quality, design, capabilities), *item self* (personal use, consumption issues), and *future use* (time-related issues such as durability).

Developing these concepts further, the item dimension is the extent to which someone feels informed about the properties and capabilities of a product, including its physical dimensions, technical capabilities, and quality. Applied to a shirt or a pair of sunglasses, attributes such as size and strength could be regarded as properties of the item. For the item self dimension, which is concerned with the interactive relationship between the item and the user/consumer, relevant information includes perceived fit or appearance when worn (for clothing). Finally, the time dimension covers temporal issues, such as the anticipated useful life, and whether colors will fade.

To operationalize the dimensions, we conducted interviews to determine product attributes used when evaluating a selection of products (jeans, shirts, and eyewear). These attributes were then abstracted into the items in Table 1 and assessed using the scale validation exercise described earlier. Overall, the list covers a variety of questions/issues that people wanted to answer when evaluating a physical product. Each is associated with one of the three dimensions.

Note that although our conceptual measure comprises three dimensions, *item*, *self*, and *time*, we do *not* predict that each dimension will be equally important (or even required) for every product. Rather, we anticipate some variation between products. For example, the *future* dimension should be important when time must be considered. This would include selecting a transportation mode, assessing items designed to be long lasting, or products for which value is obtained when the consumer indicates time is a "complementary resource" (Jacoby et al. 1976). In other words, our multidimensional *feeling informed* measure is a composite indicator that allows the importance of each dimension to vary between products.

Table 1 Theoretical Dimensions of *Feeling Informed*

		Theoretical dimension		
No.	I feel informed about...	Item	Self	Time
In1	What the product looks like	X		
In2	What the product looks like on me		X	
In3	Benefits I might experience			X
In4	The true nature of the product	X		
In5	The overall quality of the product	X		
In6	Objective characteristics of the product	X		
In7	Experiences that are relevant for my needs		X	
In8	All of the types of experiences I can expect			X
In9	How my experiences might change over time			X
In10	What the product is really like to use or consume	X		
In11	The outcomes I can expect to experience in future			X
In12	The extent to which the product meets my requirements		X	
In13	Ways in which the product will not satisfy my needs		X	
In14	How experiences with this product compare to experiences with other similar products		X	

Evaluative Attitude. Evaluative attitude refers to a customers attitude to a product, specifically whether a consumer holds a utilitarian or value-expressive evaluative attitude toward a product. Self-image effects have been measured in other studies (e.g., Bearden et al. 1989). However, those scales are designed for contexts not relevant for this study. Candidate items for a new measure were therefore developed to assess a consumer's attitude to a specified product. These items, derived from Johar and Sirgy's (1991) description of the utilitarian and value-expressive attitude functions, are shown in Table 2. Two items assess the use of utilitarian considerations (items 6 and 8), and the remainder involve different types of self-image. These self-image items assess the use of self-image considerations in general (item 1), to maintain (items 2 and 10) or acquire an image (items 4 and 11), and whether the image used in evaluation is the actual self (items 5 and 7), an ideal self (items 3 and 4), the actual social self (item 9), or an ideal social self (item 12). Items ultimately used in analysis are marked with a tick, and loadings are shown in the appendix.

Table 2 Theoretical Dimensions of *Evaluative Attitude* Items

	Theoretical dimension addressed				
		Type of self-image			
Indicator	Utilitarian	Actual self	Ideal self	Actual social	Ideal social
1 I would wear [item] as a form of self-expression		x	x	x	x
2 I would wear [item] to maintain my current image		x		x	
3 My evaluation of [item] is based on an image of my ideal self			x		
4 I choose [item] based on the way I would like to see myself			x		
5 I choose [item] based on the way I actually see myself		x			
6 For me, [item] is chosen mainly for practical reasons	x				
7 I would wear [item] as a statement about my personality		x			
8 I would choose [item] based on its suitability for a task or activity	x				
9 My choice of [item] is based on what it tells others about me				x	
10 The specific style of [item] I would choose has a lot to do with the way I am		x		x	
11 The specific style of [item] I would choose has a lot to do with the image I would like to have			x		x
12 Making a decision about buying [item] has a lot to do with how I would like other people to think about me					x

Note. Items 6 and 8 are reverse coded, and only items 3, 7, 10, 11, and 12 are used in analysis.

Scores from these operationalized measures indicate whether an attitude is value-expressive or utilitarian. An extreme high score indicates that the value of a given product to a particular person stems entirely from symbolic (extrinsic) product qualities, such as what the consumer believes that product tells about himself or herself about himself or herself. Extreme low scores mean that value is utilitarian in nature, driven by functional (intrinsic) characteristics, such as strength or size. Between these extremes, both attitude types influence the customer's decision to some degree.

Perceived Usefulness of an Online Store. Based on the system usefulness definition formulated by Davis (1989, p. 320) for the technology acceptance model, we define the perceived usefulness of the online store as "the degree to which a person believes that the design of an online store enhances his or her ability to shop for products." Perceived usefulness, which has a long history in information systems research as a predictor of eventual use, was selected because it is a generalized measure of the success of both the process and the outcome. For this reason, it is preferable to satisfaction, which typically only assesses feelings of contentment with the outcome (Kohli et al. 2004). The items used here to measure perceived usefulness (see appendix) are derived from Davis (1989) but are modified to suit the task and online shopping environment. Like the other measures we use, perceived usefulness was pretested in interviews.

Experiment Design

Participants visited (1) an online clothing store to assess a shirt and a pair of jeans and (2) an online eyewear store to assess an eyeglass frame and/or a pair of sunglasses. Treatments were administered using a repeated measures design with random assignment to treatments and randomized product evaluation order (i.e., variation in which product was examined first, according to a predefined schedule in which each product is examined first an equal number of times). Each participant was paid equally and worked in a one-on-one session with the experimenter. Two live e-store systems were used to increase the generalizability of results and to differentiate treatment effects from store-specific and product-specific effects. We focused on products that pretesting interview sessions indicated were seen as value expressive or utilitarian by different people to allow us to assess the relationship between evaluative attitude and the extent to which each person felt informed after examining product details online.

Treatment Groups. The specific treatments assigned to each person were drawn from a list of randomly ordered treatment blocks. One treatment, the basic catalog, was used as a control group. To prevent contamination of results, everyone viewed either the control representation only (i.e., evaluate only using the catalog) or a different display in which the VM representation was available (see Figure 1). For the clothing VM treatment, each participant configured a VM to produce a virtual self-image, whereas for eyewear, a digital photograph was taken of the participant's face (by a researcher) and uploaded to the vendor's system (via the website), where an image of the eyewear was superimposed over that photograph.

Although four products were available for examination, most sessions involved only two or three assessments, which caused the number of times that each item was examined first or second to differ slightly from the plan. This difference was examined in a series of tests for potentially confounding influences from

Table 3 Participant Characteristics

Sex	Number	Education	Number	Age	Number
Female	35	High school only	26	18–24	33
Male	32	Diploma	2	25–30	7
		Completed undergraduate degree	21	31–35	6
		Masters degree or higher	18	36–40	9
				41–45	5
				46–50	2
				51+	5

Table 4 Count of Sessions by Number and Type of Item Examined

Number of items evaluated	Types of items evaluated: Clothing only	Eyewear only	Clothing and eyewear
1	2	15	—
2	13	21	2
3	—	—	10
4	—	—	4

participant characteristics (age, years of Internet use, and education level) and administrative procedures (treatment order and number of products examined). We minimized the impact of prior knowledge of the products and stores by avoiding stores and brand names that were likely to be familiar to participants, but also asked each participant about his or her knowledge of the stores and brands at the start of a session. No participant reported here was in any way familiar with either store—not surprising, given that the experiment was conducted in Australia, where neither store has any visible market presence. It is also a methodological strength of the experiment: people with no prior exposure to the brands should not have prior knowledge/expectations about the vendors or the products, and any opinions formed should be attributable to information viewed in the experiment.

Participants

The conceptual population chosen was all Internet users who would have reason to evaluate the products on offer, focusing on people who have actually conducted commercial transactions via the Internet. As an external validity strategy, therefore, an effort was made to ensure that, based on Census Bureau statistics (2005), professionals from a wide range of age groups were recruited (very few were undergraduate students). In addition, each participant only evaluated items that he or she would conceivably purchase (e.g., only prescription eyeglasses users were allowed to evaluate eyeglass frames).

Table 3 shows that the final sample comprises 35 females and 32 males and that the typical participant has completed a bachelor's or master's degree. This population does not include the 20 people who assisted with scale development or pilot testing.

To recruit these participants, email messages were initially sent to final year information technology students at the University of Melbourne and to managers in both the Australian Taxation Office and the Australian Securities and Investments Commission. The former was chosen as an initial recruitment point because its employees are highly paid and are among the most highly educated. Some participants recommended the study to colleagues, resulting in additional responses (screened to ensure they actually were in a required age group and had not previously visited the stores). More targeted calls for participation were issued to members of a local church community and parents associated with a local school. Recruitment activities ceased when we reached our target of 30 observations per treatment (based on power analysis estimates).

Procedure

Sixty-seven sessions were run, each lasting between 45 and 90 minutes, including a short break after 30 minutes, and each run by the same investigator using a standard protocol. First, a preprepared briefing was read about the experiment (2 minutes) and the participant was asked to complete a consent form and demographic survey (5 minutes). A card listing the first item to examine and the activities to perform while evaluating was then provided. Because the focus of the experiment was on evaluation rather than site usability, the researcher guided the subject to the required Web page using a presupplied script. If the participant had been assigned to a VM treatment, the model was next configured (5–10 minutes). The participant then examined product information (approx. 10 minutes) and completed the survey (up to 10 minutes, including a check for completeness by the researcher). Last, the participant was given the option of finishing the session, although most opted instead to examine a second or third item (and four eyeglass wearers opted to evaluate all four products). Table 4 shows the number of sessions where one, two, three, or four items were evaluated. More than three-quarters of sessions were restricted to a single store.

During a session, each participant was encouraged to verbalize thoughts in a semistructured interview using probes such as "What are you thinking now?" and "Is this what you expected to see?" Statements were recorded. The survey questions completed at the end of each evaluation also prompted some comments, although most verbal data were restricted to the 10 minutes in which the product information was examined. This verbal data provided indepth information about attitudes toward the products and how the products are typically evaluated.

Results

Data Analysis Methods

Both think-aloud interview data and quantitative data from a questionnaire were gathered in each session. To analyze quantitative data, two statistical estimation techniques were employed: partial least squares (PLS) using SmartPLS version 2.0.M3 (Ringle et al. 2005) and TOBIT regression analysis using EViews 6.0 (QMS 2007). PLS was used because it is suited to testing predictive research models where the emphasis is on theory development and measures are new (Chin 1998), as is the case here. We also used TOBIT analysis because it is specifically designed for situations where the dependent variable has an upper and/or lower limit (we use a seven-point Likert scale, so all scores are between 1 and 7).

All statistical analysis went through two steps. First, using PLS, we estimated unstandardized latent variable scores for each experiment session (as well as the r-squared, correlations, and model quality statistics). These latent variable scores were then transferred to EViews and analyzed using TOBIT regression to determine interaction path coefficients (an estimate of the slope of the evaluative attitude variable for each treatment group was required for hypothesis testing). This was done using a procedure known as testing the simple slopes (Aiken and West 1991), in which the treatment dummy variable coding scheme is switched for each analysis (e.g., $F = 0$, $M = 1$ becomes $F = 1$, $M = 0$). This separate analysis was required to ensure that when the coding scheme was changed, the weightings, loadings, and scores were not reestimated (which would have made slope estimates noncomparable). Multivariate analysis of variance is used to test for possible confounding influences. That test indicates that neither participant characteristics (age and education) nor administrative procedures (treatment order and number of products examined) had any systematic biasing effect on responses.

The interview data were assessed using "extreme case analysis" (Caracelli and Greene 1993), in which qualitative data associated with extreme quantitative observations are compared to provide insight into group characteristics and differences between groups. Descriptive codes for statements within each interview were developed for this analysis using standard qualitative procedures (Auerbach and Silverstein 2003), except that codes were based on the hypothesis testing requirements and so did not "emerge," as would occur in grounded research. These codes were assigned according to whether the statement concerned an entity (technology, vendor, or product), a product attribute (e.g., color, size, or material), a positive/negative opinion, the nature of any problem, or a utilitarian/value-expressive-related issue (codes were verified by each author). To illustrate the scheme, an extract from participant M18's transcript (examining eyeglass frames) marked up with codes reads:

> I trust it more than the initial photo of the frames. <<trust>><<display>><<positive>> What I don't get is a feel for how they suit me. <<display>><<negative>><<personal requirement>> <<lacks personal suitability information>> I play cricket, so I want frames that can take knocks. <<functional>><<lacks durability information>>...

Through this method, we were able to assess the generality of attitudes expressed for each treatment. Distinctly different types of comments were, in fact, evident for high and low scores in each treatment group, and representative comments for these extreme cases are reported in the analysis section.

Measurement Properties

A variety of statistics, including interconstruct correlations, average variance extracted (AVE), and composite reliability (ρ_c) are shown in Tables 5 and 6. For all latent variables, Cronbach's alpha scores and composite reliability exceed the recommended thresholds for exploratory research of 0.6 and 0.7, respectively (measures are internally consistent), and the AVE is more than 0.5 (satisfactory level of convergent validity). Bold diagonals in Table 6, showing the square root of the respective AVE, are greater than off-diagonal correlation scores, indicating that measures also demonstrate satisfactory discriminant validity (Fornell and Larcker 1981).

Table 5 **Latent Variable Reliability and Validity Statistics (PLS)**

	R square	ρ_c	Cronbachs α	AVE	Redundancy
Eyewear ($n = 79$)					
Inform (item)	0.18	0.77	0.61	0.94	0.00
Inform (item on me)	0.27	0.81	0.63	0.66	0.00
Inform (item in future)	0.21	0.88	0.83	0.95	0.00
Perceived usefulness of store	0.34	0.94	0.92	0.96	0.02
Evaluative attitude	—	0.93	0.90	0.96	—
Clothing ($n = 58$)					
Inform (item)	0.19	0.85	0.77	0.90	0.00
Inform (item on me)	0.30	0.91	0.85	0.92	0.00
Inform (item in future)	0.15	0.88	0.83	0.96	0.00
Perceived usefulness of store	0.38	0.95	0.94	0.97	0.02
Evaluative attitude	—	0.90	0.90	0.90	—
Combined ($n = 137$)					
Inform (item)	0.15	0.84	0.70	0.89	0.00
Inform (item on me)	0.18	0.83	0.63	0.75	0.00
Inform (item in future)	0.10	0.88	0.83	0.94	0.00
Perceived usefulness of store	0.32	0.94	0.92	0.96	0.02
Evaluative attitude	—	0.93	0.91	0.96	—

Table 6 Latent Variable Correlations (PLS)

	1	2	3	4	5	6
Eyewear						
(1) Inform (item)	**0.73**	—	—	—	—	—
(2) Inform (item on me)	0.28	**0.83**	—	—	—	—
(3) Inform (item in future)	0.71	0.30	**0.81**	—	—	—
(4) Perceived usefulness of store	0.45	0.42	0.38	**0.87**	—	—
(5) Evaluative attitude	0.27	−0.16	0.25	0.19	**0.84**	—
(6) Attitude ∗ model	0.06	0.39	0.03	0.18	0.06	**0.95**
Clothing						
(1) Inform (item)	**0.77**	—	—	—	—	—
(2) Inform (item on me)	0.62	**0.88**	—	—	—	—
(3) Inform (item in future)	0.46	0.34	**0.81**	—	—	—
(4) Perceived usefulness of store	0.56	0.68	0.58	**0.90**	—	—
(5) Evaluative attitude	−0.22	−0.35	−0.12	−0.28	**0.80**	—
(6) Attitude ∗ model	0.39	−0.07	0.14	−0.11	0.12	**0.98**
Combined						
(1) Inform (item)	**0.72**	—	—	—	—	—
(2) Inform (item on me)	0.37	**0.84**	—	—	—	—
(3) Inform (item in future)	0.70	0.39	**0.78**	—	—	—
(4) Perceived usefulness of store	0.51	0.40	0.37	**0.87**	—	—
(5) Evaluative attitude	0.17	0.00	0.15	0.14	**0.85**	—
(6) Attitude ∗ model	0.01	0.39	−0.01	0.15	0.17	**0.97**

Note. Figures in the bold diagonals show the square root of the AVE.

Loadings for all indicators are shown in the appendix. Variables with loadings of less than 0.5 were excluded on the basis that even where an item was justified theoretically, a low loading indicated that the item (1) may not have been interpreted as intended and (2) would add little or no explanatory power, and potentially even bias estimates (Hulland 1999). The sample size also constrained the number of indicators that could be used in any model. As a rule of thumb, the most complex construct should contain no more than 1 indicator for every 10 observations (Chin 1998). Because the clothing store data contain only 58 observations, only five indicators per latent variable were included in that model. That restriction was then extended to the models for the eyewear data and the combined data set so all path models could be constructed using the same indicators and to permit direct comparison of results. As a result, some indicators for both the perceived usefulness of the online store and evaluative attitude are not included in any model. Those that are used are statistically highly reliable measures of each construct.

Evaluative attitude indicators load strongly, except for items 5, 6, 8, and 9. Items 6 and 8, measuring utilitarian attitude strength, were expected to have high scores when other scores were low, and this is generally observed. However, in approximately 10% of cases, values for items 6 and 8 were inconsistent with each other, suggesting possible contamination. The five indicators ultimately used in analysis (3, 7, 10, 11, and 12) were selected because they load strongly (and so minimize bias in estimates) and are representative of all self-image types described in the construct defintion. These indicators have loadings above 0.8, and high loading scores are evident within the clothing and eyewear data when assessed individually.

Loadings for the perceived usefulness of the online store measure are also high. Because all indicators have acceptable loading scores, minimizing bias was not a major issue. The five items selected—U1, U2, U3, U6, and U7—were judged to be the clearest indicators of process usefulness and satisfaction with the process, and therefore the best fit with the theoretical focus of Hypothesis 1. Specifically, items U1 and U7 (useful when shopping, can assist shopping) measure usefulness directly, item U3 (make me more productive) assesses the efficiency of the process, and items U2 and U6 (increase quality of shopping, would recommend to others) assess satisfaction with the process.

Indicators for the feeling informed measure were first assessed in terms of whether they demonstrated high loadings on the dimension each was designed to represent and low loadings on other dimensions. Through this process, items In1 and In2 were found to form an appearance-related factor, In13 and In14 loaded weakly on all factors (and were eliminated), and In7 and In12 loaded strongly on the item and time dimensions, respectively and so are used as indicators for those latent variables.

Hypothesis Testing

The research model in Figure 3 was operationalized in structural equation model format. Relationships between latent variables were then assessed for each store data set, both separately and as a pooled sample using PLS analysis. Hypothesis 1 predicts that feeling informed influences the perceived usefulness of an online store. It therefore involves testing the relationship between the perceived usefulness of an online store and the three informed measures, while avoiding the interaction interpretation errors described by Carte and Russell (2003).

Hypothesis 2 predicts an interaction between consumer perceptions of a product and the product depiction, whereby consumers who have a value-expressive evaluative attitude will feel more informed when using a VM as a product assessment aid and less informed when using only the catalog (and vice versa for consumers who have a utilitarian evaluative attitude). It therefore involves testing the simple slope (the direction of the effect) for each treatment group. Hypothesis 2 thus is supported if (1) an interaction coefficient is statistically significant, (2) the effect is positive for the VM treatment group and negative for

Table 7 Hypothesis 2 Tests

	Variable	Interaction coefficient	Effect slopes: VM treatment coefficient	Effect slopes: Catalog treatment coefficient	R^2 main effects model	R^2 interaction model	F statistic for R^2 increase
Eyewear	(1) Inform (item)	0.40**	0.34**	−0.06	0.08	0.18	9.25**
	(2) Inform (item on me)	0.82***	0.37*	−0.45**	0.15	0.27	12.28***
	(3) Inform (future)	0.62***	0.45***	−0.17	0.06	0.21	14.01***
Clothing	(1) Inform (item)	0.48**	0.12	−0.36***	0.11	0.19	5.12*
	(2) Inform (item on me)	0.62**	0.35*	−0.28*	0.15	0.30	11.85***
	(3) Inform (future)	0.11	0.02	−0.20	0.13	0.15	1.30
Combined	(1) Inform (item)	0.36***	0.24***	−0.12*	0.04	0.15	16.90***
	(2) Inform (item on me)	0.43**	0.28**	−0.14	0.13	0.18	7.92**
	(3) Inform (future)	0.36**	0.25**	−0.11	0.04	0.10	8.91**

Notes. F test parameters: eyewear = $F(1, 75)$; clothing = $F(1, 54)$; combined = $F(1, 133)$. Interaction and slope coefficients calculated using TOBIT regression. * = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$.

the catalog treatment group, and (3) the interaction produces a significant increase in the r-squared statistic (from Jaccard et al. 1990). Because of the directional nature of the slope tests, one-sided probabilities are used. Table 7 shows the results of these interaction effect tests.

Results

The results shown in Table 7 and Figure 4 support Hypothesis 1. In each model shown in Figure 4, two informed dimensions, "item" and "item on me," have significant path coefficients, leading to perceived usefulness, and explain over 30% of the variance. The "future" variable correlates with perceived usefulness, but paths from it are not significant, indicating that it explains no unique variance.

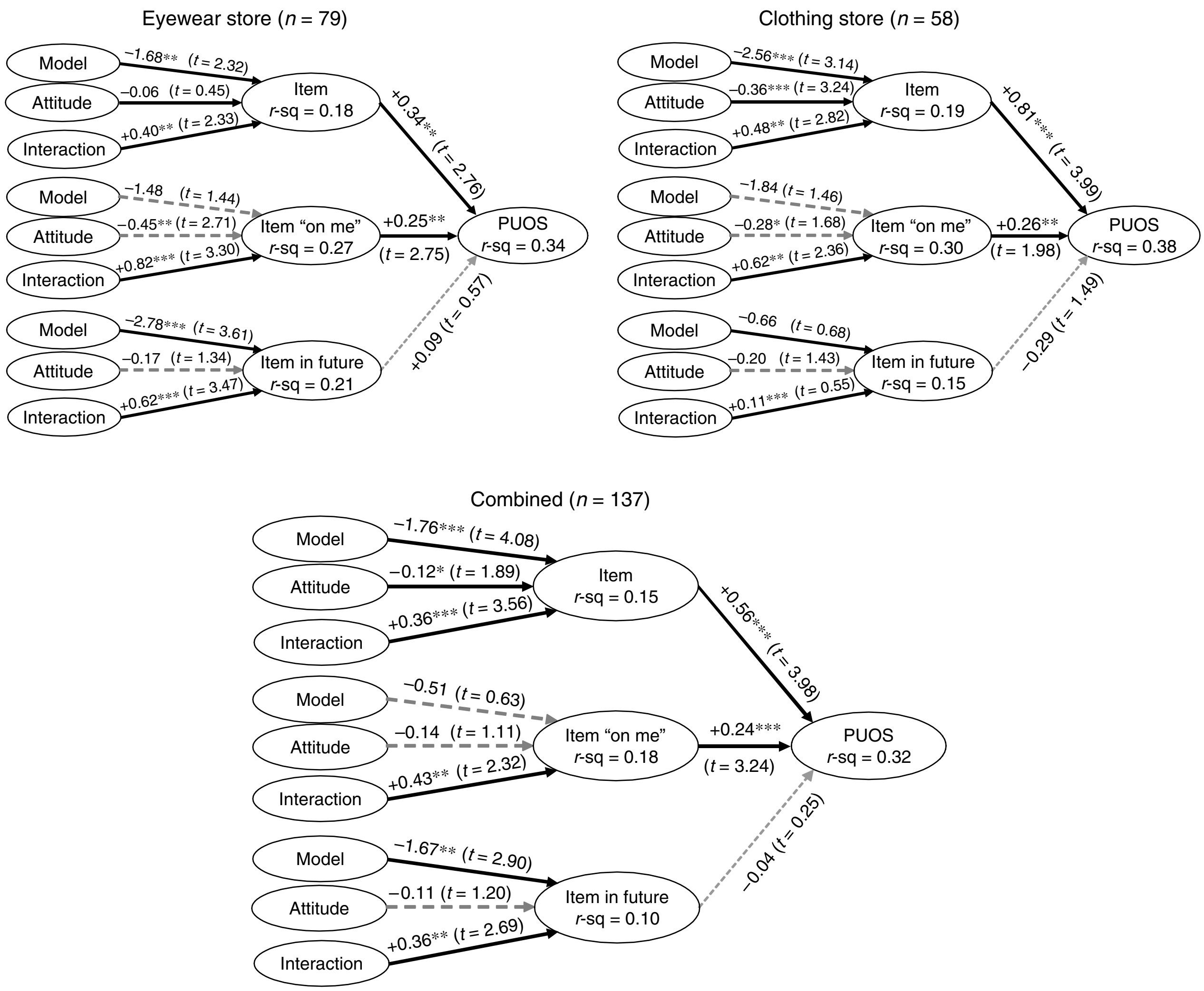
Hypothesis 2 is also supported, although the results are not uniform (see Table 7). Effect slopes are in the direction hypothesized and 11 of 18 are significantly different from 0. Furthermore, eight of the nine interaction coefficients are statistically significant and each interaction effect increases the r-squared statistic significantly. Eyewear store results show that attitude has a consistently strong effect on all information requirements for VM users in the direction predicted (people with value-expressive attitudes felt highly informed, whereas those with utilitarian attitudes did not feel at all informed). A weaker response was observed for catalog users, with only the "item on me" dimension showing a strong effect. For the clothing store, catalog users show multiple strong attitude-based responses, whereas among VM users, this response is only found for visual information (although this is the variable one would most expect to produce a strong attitude-based effect).

Results for the combined data set are similar to the eyewear results, with attitudes interacting strongly with the display for all information types. The interaction effect is pronounced for VM users but is weak for consumers who evaluated only with the aid of the catalog. We speculate that substantial effort has gone into ensuring that VMs meet value-expressive information requirements and that less attention has been devoted to the catalog, with the result that utilitarian needs are not addressed as well. Note that the explanatory power of the combined model is weaker. We attribute this weakness to small differences in the weights and loadings of indicators between systems that the global model is unable to resolve.

Interview data enable us to perform complementary tests of the hypotheses using a separate data set (methodological triangulation). These data show patterns in attitudes toward the representations in observations of the extreme evaluative attitudes (see Table 8 for quotes from extreme observations for each treatment group that are typical of the wider set of extreme observations). VM users with low evaluative attitude scores (utilitarian attitude) were skeptical about the value of the VM (M17 and M30 quotes are typical for this group), whereas high scores (value-expressive attitude), such as F05 and M07, expressed positive thoughts. Conversely, catalog users with low evaluative attitude scores (M13) expressed positive responses to the catalog, whereas those with high scores (F02) expressed dissatisfaction, particularly with the images. These differences are consistent with the predicted relationship between evaluative attitude and feeling informed (positive for VM users and negative for the control group).

To further highlight the correspondence between observed responses and predictions, each statement listed in Table 8 is located in Figure 5 according to the respective informed and evaluative-attitude variable scores (calculated using PLS), together with a plot of the line of best fit for each treatment group. That path values in Table 7 follow a consistent pattern means that the interaction shown in Figure 5 (based on the pooled data set) is representative of all

Figure 4 Structural Equation Model Results (PLS) for Individual Stores and Pooled Data



Note. Significance tests: $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

interactions. The attitudes expressed and the scores recorded correspond quite closely to our theory-based predictions. For example, in the catalog-only group, participant F02, who has an extreme value-expressive attitude toward sunglasses and did not feel informed, explained that assessment by stating that she needed to see the sunglasses being worn by someone (preferably herself or someone like her) to be able to assess them. Participant M13, however, who has an extreme utilitarian attitude, did feel informed. The transcript indicates that finding details about functional qualities (such as fabric type) was critical in his assessment, and the high score recorded shows that this requirement was met.

Conclusion

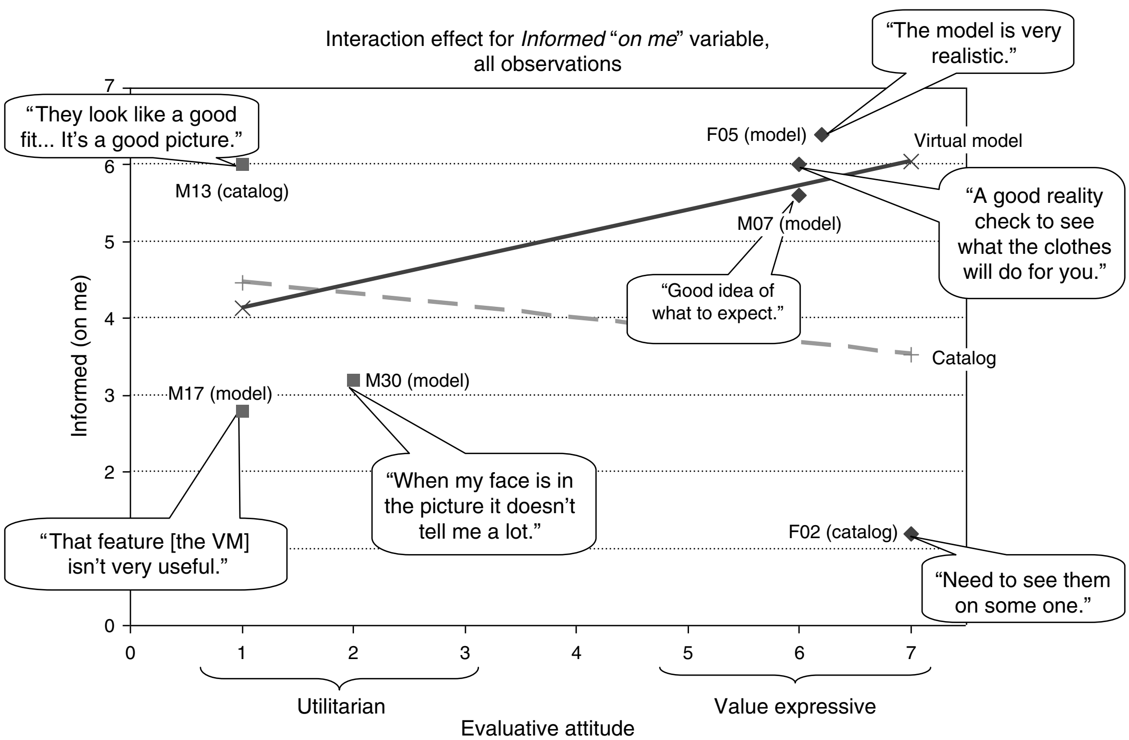
The focus of this paper has been on how consumers respond to VMs compared with descriptions in the style of more traditional mail order catalogs and how that response influences perceptions of the store. Two hypotheses were derived from theory and tested. These results, summarized in Table 9, broadly support all hypotheses. Moreover, results from analyses of both quantitative and qualitative data are consistent across different systems and products and the statistical models have substantial explanatory power.

The key findings are, first, that consumers who feel informed are likely to have a favorable attitude toward the store irrespective of whether a purchase occurs. The second key finding is that when the information provided corresponds to the attitude-based requirements of a consumer, that consumer is likely to feel informed. However, it is not the technology per se that causes a consumer to feel more or less informed, but rather the fit between the type of information presented and the type of information sought by the consumer.

Table 8 Indicative Statements Explaining Responses to Treatments

Participant	Product	Treatment group	Evaluative attitude	Statement
M17	Sunglasses	VM	Utilitarian	... That feature [the VM] isn't very useful. The photograph [of the sunglasses] is a bit like you see in real life, but you miss out on the subtleties of the colors, which are not too successfully shown here, I think. I guess it would be useful for you to look at [this] before you go to the shop, but this bit [the model] wouldn't be the major thing; it would mainly be just looking through the range and having a reasonable inspection of them.
F07	Jeans	VM	Value-expressive	It's definitely good to try it on the model ... it [the VM] is a good reality check to see what the clothes will do for you. I see all the details I really need to see. I think it is a really good model—the way she is standing, and where the fat goes and everything like that.
M30	Frames	VM	Utilitarian	When my face is in the picture it doesn't tell me a lot. I want frames to be usable and robust and to last rather than being something I will need to replace in four weeks when the fashion changes. The fancy features [of the VM] don't add much value to my shopping.
F02	Sunglasses	Catalog only	Value-expressive	I have no idea what they are talking about [the technical specifications], but it sounds fantastic. ... The photograph isn't enough. I need to see them on someone. Front-on, side-on. Male, female, preferably female. Has to be someone actually wearing them. The lens is tinted, I think, but I would have to make sure. I need a better picture.
M13	Frames	Catalog only	Utilitarian	I just buy old-style jeans. I don't go for stretch or anything like that. [looks at photograph]. They look like a good fit. That's not a bad size. It's a good picture. [Reads description] I like 98% cotton. It says traditional fit. I like traditional fit ... not like a flair or anything like that.
F05	Jeans	VM	Value-expressive	I really like this model. I get a good indication of what the jeans look like, like the rise—whether it is a hipster or slightly higher—and how they fit around the legs. And the model is very realistic I think...
M07	Jeans	VM	Value-expressive	The model gives you a good idea of what to expect. Definitely. I think it more or less tells me how [the jeans] will suit me.

Figure 5 Graph of Interaction Effect Overlaid with Plot of Extreme Values



Note. Data points refer to quotations listed in the text.

In reaching this conclusion, we have made two principal contributions to theory. First, the relationship we find between *feeling informed* and *perceived usefulness of online store* complements and extends past research, particularly the *diagnosticity-usefulness* relationship found by Jiang and Benbasat (2007a), although the emphasis of each study is quite different. The Jiang and Benbasat study proposes an effect from the intrinsic properties of the presentation (the technology is the agent), whereas we look at when a consumer will seek that information (the attitude is the agent). In addition, theory and empirical measures are developed in more depth here than in past studies, resulting in a more nuanced discussion of the relationship between person, product, and store design. For example, although it has long been clear that multiple types of information are integrated in a purchase decision and that evaluation support technology can assist that process (Zeng and Reinartz 2003), our analysis indicates that each information requirement can independently affect one's attitude toward the store, that no evaluation support tool is likely to be helpful to all consumers, and that a tool that is helpful to one group of consumers may prove worthless to others, or even hinder them.

Second, our demonstration that an individual's attitude to a product influences the effectiveness of a representation method applies and extends the functional theory of attitudes (Katz 1960) and is a contribution to the long tradition of research into how individual-level factors affect the way in which people interact with information technology (Agarwal and Prasad 1999, Glassberg et al. 2006, Robey 1979). By demonstrating that effect, we show clearly that the task and the technology are not the only determinants of performance as is claimed in technologically deterministic theories such as cognitive fit (Vessey and Galletta 1991). The strong interaction effect observed indicates that, even when the task (evaluating a product) is held constant, variation in end-user attitudes toward the *object* of the task influences task outcomes for a given technology. Attitude toward an item is a pervasive factor but is not a property of either the consumer or the item alone and so constitutes a moderating influence quite distinct from the expertise, self-efficacy, and other individual-difference effects proposed by mainstream information systems (IS) theories, such technology acceptance model (TAM) (Davis 1989, Venkatesh and Bala 2008) or task-technology fit (TTF) (Goodhue 1998). Instead, our results indicate generic differences in information requirements caused by the different generic attitudes a customer has toward the object of the task and show that systematic differences in attitude toward the product lead to users actively seeking different information. Consequently, the outcome of the evaluation task is determined by the fit between the type of information provided and the type of information sought by the customer, rather than between the technology and the task.

Our work also has a number of practical implications. Our *feeling informed* measure shows that understanding customer information requirements fully requires more than just a single outcome indicator. Brief technology-focused measures, such as *perceived diagnosticity* (Jiang and Benbasat 2007b), are useful for obtaining user opinions about a specific feature of a website. In contrast, our measure would be used by a researcher or designer to evaluate the impact of a technology on a specific population of customers. Any website evaluation based on this measure would only apply to the particular circumstances of the exposure to the technology (as in the current experiment), because it is not assumed that there is a singular relationship between the measure and the informativeness of the technology itself.

The relationship found between feeling informed and the perceived usefulness of the store indicate that vendors need to be careful when designing information resources for consumers, but also that good design can potentially provide considerable economic benefits. In particular, vendors whose content meets attitude-based requirements should receive a higher number of repeat visits, and through these visits, a larger sales volume (assuming no problems with pricing, availability, and so on). As a general rule, meeting attitude-based requirements is likely to involve giving customers a choice of virtual discovery and evaluation modes designed to suit particular attitudes. Many online stores, including Lands' End, Eyeglasses.com, and Amazon, are implicitly designed in this way and meet customer needs because they allow a customer to select an interaction style to suit a particular value attitude.

The moderated effects found in this experiment indicate that technocentric visions (such as VMs), are high-risk ventures because they provide strong appeal only for one subset of the population (those with a value-expressive attitude) while potentially alienating others (utilitarian attitudes). Investments in VM systems will therefore often *not* make economic sense. In fact, a VM system is likely to be a viable investment only if (1) products will be considered self-image relevant by the majority of customers, (2) the VM interface is significantly more informative (personally valuable) to customers, and (3) high levels of feeling

Table 9 Summary of Results

Hypothesis	Variable/dimension evaluated	Result		
		Eyewear data	Clothing data	Combined
1 The more informed a consumer feels, the greater the perceived usefulness of the store is		**Supported**	**Supported**	**Supported**
2(a) Consumers who hold a more value-expressive attitude toward a product will feel more informed after evaluating using a virtual model				
(positive coefficient for VM treatment)	Informed—item	**Supported**	Not supported	**Supported**
	Informed—item "on me"	**Supported**	**Supported**	**Supported**
	Informed—item in future	**Supported**	Not supported	**Supported**
2(b) Consumers who hold a more utilitarian attitude toward a product will feel more informed when the evaluation involves only a traditional catalog				
(negative coefficient for catalog treatment)	Informed—item	Not supported	**Supported**	**Supported**
	Informed—item "on me"	**Supported**	**Supported**	Not supported
	Informed—item in future	Not supported	Not supported	Not supported

informed translate into more sales to offset the ongoing cost of the VM system. If these conditions are not met, VM technology will be an unwarranted expense and possibly even prove counterproductive.

However, the strong interaction effect found indicates that any support technology should be managed carefully; otherwise the store could inadvertently alienate potential customers. To illustrate the difference between controlled and uncontrolled approaches, we now describe four possible development approaches. The first, which might be called the "technonaïve" approach, is to provide a variety of potentially helpful technologies according to what can be developed (and what a developer thinks customers will find useful). Problems with this approach are, first, that the choice of technology affects consumer evaluations of the store, and second, this solution implicitly assigns to technical specialists the task of selecting the market segment that the business will serve. These are decisions that should be made explicitly and strategically.

A second solution, the "techno-utopian" approach (Kling 1994), involves trying to build a store that appeals to all consumers. Such a store is not feasible in the physical world, because it requires physical variation according to individual attitudes. For example, an assessment of customer attitudes could be undertaken and separate forms of product support then developed to meet the information requirements associated with each product attitude. However, apart from the technical challenge of developing a store with many potentially radically different designs (to suit individual shoppers), it is unclear whether shoppers would respond positively to significant adaptive variation; some designs may even be incompatible and so could not be supported simultaneously. The extent to which multiple product information delivery strategies for the same e-store interfere with each other is an interesting open empirical question, which goes to the heart of the question of what selling strategies can be applied in an e-shop that are not feasible in a physical shop. However, this approach is also problematic strategically because this solution is merely a passive response to the environment, with the amount of development work required dependent on the number of distinct attitudes identified and how frequently they change.

A third customer-driven, "boutique store" approach is to develop product information or even the entire store based on customer attitudes. One way to implement this approach is to accept the existence of market segments with specific generic attitudes to the product, make a strategic decision about which attitudes to target, and then build a store specifically (and consistently) based on the requirements of that segment. Designing the look and feel of a store to appeal to a specific market segment is common practice among physical retailers (Danneels 1996), although it is unclear whether intentional use of this practice is as common among Internet-based retailers.

Our fourth and final approach, which we call "product-attitude integration," is a more radical alternative. This requires an integrated image-building strategy in which the tangible product, attitudes toward it, and complementary information support are developed simultaneously, each being a part of the "extended" product. Rather than building a website based on empirically determined consumer attitudes to an existing product (option three above), the website here is built to deliver information that fits attitudes that have been *designed into* the product. Apple has used this strategy effectively for years, most recently with its marketing of the iPod line of devices. This image-based marketing strategy allows the company to be more certain of the symbols associated with the product and thus to more easily determine individual information needs (particularly which elements need to be differentially emphasized to attract different types of users). From a strategic management perspective, the phenomenal success that Apple has achieved using that approach is particularly instructive, because it implies that competitors must look beyond organizational characteristics to the individual attitudes of customers if they are to understand and emulate that success. These attitudes, which underlie consumers' product preferences, give insight into customer requirements, the personal significance of each requirement, how customers "connect" with products, and, according to our findings, how (and what) information needs to be communicated to support those requirements and connections (Reppel et al. 2006).

Two limitations of this study warrant mentioning. First, our study is restricted to wearable products, and one of the treatments involved use of a highly specialized system (the VM). Strictly speaking, therefore, we can claim support for the application of our theory to a particular class of system but not more general support for its application to other products or support mechanisms. Second, we did not investigate either learning effects (e.g., ability to find information more easily after multiple sessions) or the possibility that continued use of the VM or the catalog system might influence product attitudes. Neither effect is likely to falsify our claims, but each could change the magnitude of the effects found.

The claims we make here about the implications of our findings for research and practice are contingent on the generalizability of those results to other settings. To maximize generalizability, we ensured that the demographic characteristics of participants approximated our conceptual population (Internet users who are wealthy enough to shop online) and, within that sample, only potential users of each product were allowed to evaluate (e.g., only prescription eyeglass wearers could evaluate frames). Because the recruited population reflects the wider population of Internet shoppers, similar results should be found for any other representative sample. Similarly, the use of real online stores and products helps establish external validity, and random assignment to treatments has made a demand effect less likely. The use of multiple-methods increases confidence in our identification of the underlying causes of observed effects. Finally, and most importantly, the consistency of our findings across four separate products and two e-store systems lends weight to our claim that the observed effect is pervasive and therefore an important consideration in future development work involving this type of technology.

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Appendix: Measures

Informed measure

		PLS loadings (combined sample)		
I feel informed about…		Item	Item "on me"	Item in future
In1	What the product looks like		**0.74**	
In2	What the product will look like *on me*		**0.94**	
In3	Benefits I might experience			**0.73**
In4	The true nature of the product	**0.79**		
In5	The overall quality of the product	**0.73**		
In6	Objective characteristics of the product	**0.62**		
In7	Experiences that are relevant for my needs			**0.78**
In8	All of the types of experiences I can expect			**0.86**
In9	How my experiences might change over time			**0.66**
In10	What the product is really like to use or consume	**0.75**		
In11	The outcomes I can expect to experience in the future			**0.84**
In12	The extent to which the product meets my requirements	**0.73**		
In13	Ways in which the product will *not* satisfy my needs	—*		
In14	How experiences with this product compare to experiences with other similar products	0.60*		

Appendix (Continued)

Evaluative attitude

		Loadings (pooled sample, all indicators)
att1	I would wear [the item] as a form of self-expression	0.74
att2	I would wear [the item] to maintain my current image	0.79
att3	My evaluation of [the item] is based on an image of my ideal self	**0.82**
att4	I choose [the item] based on the way I would like to see myself	0.76
att5	I choose [the item] based on the way I actually see myself	0.51*
att6	For me, [the item] is chosen mainly for practical reasons	36*
att7	I would wear [the item] as a statement about my personality	**0.80**
att8	I would choose [the item] based on its suitability for a task or activity	35*
att9	The specific style of [the item] I would choose has a lot to do with the way I am	65*
att10	My choice of [the item] is based on what it tells others about me	**0.83**
att11	The specific style of [the item] I would choose has a lot to do with the image I would like to have	**0.83**
att12	Making a decision about buying [the item] has a lot to do with how I would like other people to think about me	**0.81**

Perceived usefulness of online store

Item		Loadings using all indicators
U1	I would find the computer system useful when shopping for [item]	**0.90**
U2	Use of the system can significantly increase the quality of my shopping	**0.85**
U3	Using the computer system would make me more productive when shopping	**0.87**
U4	Use of the system can decrease the time needed for important shopping tasks (when shopping for [item])	0.84
U5	Using the computer system when shopping would enable me to evaluate [item] more quickly	0.84
U6	I would recommend this system to others to use when shopping	**0.84**
U7	Considering all tasks performed when evaluating [item], my opinion of the general extent to which using this system could assist shopping is...(extremely negative...extremely positive)	**0.81**

Loadings and cross loadings (combined sample)

	Perceived usefulness	Inform1 (item)	Inform2 (on me)	Inform3 (future)	Attitude	Display (VM)	Attitude ∗ VM future	Attitude ∗ VM item	Attitude ∗ on me
U1	1.36	0.78	0.52	0.56	0.23	–0.04	0.22	0.15	0.06
U2	1.42	0.65	0.47	0.54	0.24	0.01	0.24	0.21	0.15
U3	1.43	0.73	0.56	0.48	0.26	–0.07	0.20	0.12	0.07
U6	1.32	0.65	0.60	0.50	0.09	0.20	0.36	0.32	0.28
U7	1.17	0.56	0.51	0.39	0.14	0.02	0.23	0.18	0.13
In01	0.39	0.38	0.80	0.32	0.00	0.16	0.22	0.19	0.25
In02	0.69	0.65	1.81	0.72	–0.01	0.76	0.78	0.79	0.73
In03	0.42	0.60	0.56	0.92	0.13	–0.11	0.03	0.01	–0.09
In05	0.51	0.87	0.18	0.67	0.13	–0.16	0.05	–0.01	–0.09
In06	0.36	0.67	0.26	0.40	0.00	–0.15	0.07	–0.04	0.00
In07	0.39	0.72	0.53	1.05	0.07	–0.01	0.11	0.05	–0.11
In08	0.40	0.84	0.35	1.10	0.11	–0.23	–0.03	–0.09	–0.14
In09	0.25	0.50	0.29	0.86	0.15	–0.13	0.01	–0.03	–0.13
In10	0.45	1.20	0.53	0.98	0.12	–0.12	0.09	0.00	–0.07
In11	0.40	0.86	0.32	1.11	0.25	–0.14	0.08	0.02	–0.08
In12	0.58	1.07	0.44	0.68	0.32	–0.13	0.14	0.06	0.03
att03	0.01	–0.07	0.19	–0.07	–0.07	0.50	0.41	0.45	0.42
att07	0.18	0.18	–0.12	0.16	1.42	–0.17	0.26	0.26	0.31
att10	0.14	0.12	–0.06	0.22	1.25	–0.17	0.13	0.22	0.03
att11	0.11	0.24	0.01	0.23	1.32	–0.17	0.39	0.26	0.21
att12	0.17	0.21	–0.07	0.00	1.36	–0.33	0.17	0.12	0.28
Display (VM)	0.34	0.39	0.16	0.29	1.43	–0.20	0.41	0.24	0.14
att03 ∗ VM (item)	0.29	–0.02	0.87	–0.06	0.37	2.08	2.08	2.29	2.20

Appendix (Continued)

Loadings and cross loadings (combined sample)

	Perceived usefulness	Inform1 (item)	Inform2 (on me)	Inform3 (future)	Attitude	Display (VM)	Attitude ∗ VM future	Attitude ∗ VM item	Attitude ∗ on me
att07 ∗ VM (item)	0.29	–0.02	0.87	–0.06	0.37	2.08	2.08	2.29	2.20
att10 ∗ VM (item)	0.29	–0.02	0.87	–0.06	0.37	2.08	2.08	2.29	2.20
att11 ∗ VM (item)	0.30	–0.05	0.89	0.03	0.31	2.00	1.89	2.17	1.85
att12 ∗ VM (item)	0.30	–0.05	0.89	0.03	0.31	2.00	1.89	2.17	1.85
att03 ∗ VM (on me)	0.30	–0.05	0.89	0.03	0.31	2.00	1.89	2.17	1.85
att07 ∗ VM (on me)	0.27	0.06	0.85	0.01	0.39	1.92	2.09	2.15	1.97
att10 ∗ VM (on me)	0.27	0.06	0.85	0.01	0.39	1.92	2.09	2.15	1.97
att11 ∗ VM (on me)	0.27	0.06	0.85	0.01	0.39	1.92	2.09	2.15	1.97
att12 ∗ VM (on me)	0.30	–0.01	0.97	–0.17	0.35	1.98	2.05	2.20	2.22
att03 ∗ VM (future)	0.30	–0.01	0.97	–0.17	0.35	1.98	2.05	2.20	2.22
att07 ∗ VM (future)	0.30	–0.01	0.97	–0.17	0.35	1.98	2.05	2.20	2.22
att10 ∗ VM (future)	0.40	0.12	0.90	0.06	0.41	1.81	2.04	2.04	1.82
att11 ∗ VM (future)	0.40	0.12	0.90	0.06	0.41	1.81	2.04	2.04	1.82
att12 ∗ VM (future)	0.40	0.12	0.90	0.06	0.41	1.81	2.04	2.04	1.82

Notes. Scale: Strongly disagree … strongly agree (7 point). Bold items are used in all models reported in this paper.
∗Not used.

References

Agarwal, R., J. Prasad. 1999. Are individual differences germane to the acceptance of new information technologies? *Decision Sci.* **30**(2) 361–391.

Aiken, L. S., S. G. West. 1991. *Multiple Regression: Testing and Interpreting Interactions*. Sage Publications, Newbury Park, CA.

Akerlof, G. A. 1970. The market for "lemons": Quality uncertainty and the market mechanism. *Quart. J. Econom.* **84**(3) 488–500.

Auerbach, C. F., L. B. Silverstein. 2003. *Qualitative Data: An Introduction to Coding and Analysis*. University Press, New York.

Bearden, W. O., R. G. Netemeyer, J. E. Teel. 1989. Measurement of consumer susceptibility to interpersonal influence. *J. Consumer Res.* **15**(4) 473–481.

Beck, B. 2005. Key strategic issues in online apparel retailing: The need for an online fitting solution. Accessed May 15, 2007, http://www.techexchange.com/thelibrary/online_fit.html.

Bevan, N., M. MacLeod. 1994. Usability measurement in context. *Behaviour Inform. Tech.* **13**(1) 132–145.

Blackwell, R. D., P. W. Miniard, J. F. Engel. 2006. *Consumer Behavior*. Dryden Press, Fort Worth, TX.

Caracelli, V. J., J. C. Greene. 1993. Data analysis strategies for mixed-method evaluation designs. *Educational Evaluation Policy Anal.* **15**(2) 195–207.

Carte, T. A., C. J. Russell. 2003. In pursuit of moderation: Nine common errors and their solutions. *MIS Quart.* **27**(3) 479–501.

Chang, C.-C. A., R. R. Burke. 2007. Consumer choice of retail shopping aids. *J. Retailing Consumer Services* **14**(5) 339–346.

Chin, W. W. 1998. The partial least squares approach to structural equation modeling. G. A. Marcoulides, ed. *Modern Methods for Business Research*. Lawrence Erlbaum Associates, Mahwah, NJ.

Creusen, M. E. H., J. P. L. Schoormans. 2005. The different roles of product appearance in consumer choice. *J. Product Innovation Management* **22**(1) 63–81.

Danneels, E. 1996. Market segmentation: Normative model versus business reality: An exploratory study of apparel retailing in Belgium. *Eur. J. Marketing* **30**(6) 36–51.

Davis, F. D. 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technologies. *MIS Quart.* **13**(3) 319–340.

DeBono, K. G., A. Leavitt, J. Backus. 2003. Product packaging and product evaluation: An individual difference approach. *J. Appl. Soc. Psych.* **33**(3) 513–521.

Dhar, R., S. M. Nowlis. 2004. To buy or not to buy: Response mode effects on consumer choice. *J. Marketing Res.* **41**(4) 423–432.

Engel, J. F., D. T. Kollat, R. D. Blackwell. 1968. *Consumer Behavior*. Holt, Rinehart & Winston, New York.

Eyeglasses.com. 2007. Try it on. Accessed November 10, 2007, http://www.eyeglasses.com/tryiton/.

Fitzsimons, G. J. 2000. Consumer response to stockouts. *J. Consumer Res.* **27**(2) 249–266.

Folkes, V. S. 1984. Consumer reactions to product failure: An attributional approach. *J. Consumer Res.* **10**(4) 398–409.

Folkes, V. S. 1988. Recent attribution research in consumer behavior: A review and new directions. *J. Consumer Res.* **14**(4) 548–565.

Fornell, C., D. Larcker. 1981. Evaluating structural equation models with unobservable variables and measurement error. *J. Marketing Res.* **18**(1) 39–50.

Forsythe, S. M., B. Shi. 2003. Consumer patronage and risk perceptions in Internet shopping. *J. Bus. Res.* **56**(11) 867–875.

Framesdirect.com. 2008. Virtual eyeglass try-on. Accessed August 6, 2008, http://www.framesdirect.com/framefinder.asp.

Garvin, D. A. 1984. What does product quality really mean? *Sloan Management Rev.* **26**(1) 25–43.

Glassberg, B. C., V. Grover, J. T. C. Teng. 2006. Information systems research with an attitude. *ACM SIGMIS Database* **37**(2–3) 76–85.

Goodhue, D. L. 1998. Development and measurement validity of a task-technology fit instrument for user evaluations of information systems. *Decision Sci.* **29**(1) 105–138.

Haeubl, G., V. Trifts. 2000. Consumer decision making in online shopping environments: The effects of interactive decision aids. *Marketing Sci.* **19**(1) 4–21.

Hargreaves, G., J. D. Claxton, F. H. Siller. 1976. New product evaluation: Electric vehicles for commercial applications. *J. Marketing* **40**(1) 74–77.

Herr, P. M., F. R. Kardes, J. Kim. 1991. Effects of word-of-mouth and product-attribute information on persuasion: An accessibility-diagnosticity perspective. *J. Consumer Res.* **17**(4) 454–462.

Hulland, J. 1999. Use of partial least squares (PLS) in strategic management research: A review of four recent studies. *Strategic Management J.* **20**(2) 195–204.

Jaccard, J., R. Turrisi, C. K. Wan. 1990. *Interaction Effects in Multiple Regression*. Sage Publications, Thousand Oaks, CA.

Jacoby, J., G. J. Szybillo, C. K. Berning. 1976. Time and consumer behavior: An interdisciplinary overview. *J. Consumer Res.* **2**(4) 320–339.

Jiang, Z., I. Benbasat. 2007a. The effects of presentation formats and task complexity on online consumers' product understanding. *MIS Quart.* **31**(3) 475–500.

Jiang, Z., I. Benbasat. 2007b. Investigating the influence of the functional mechanisms of online product presentations. *Inform. Systems Res.* **18**(4) 454–472.

Johar, J. S., M. J. Sirgy. 1991. Value-expressive versus utilitarian advertising appeals: When and why to use which appeal. *J. Advertising* **20**(3) 23–33.

Katz, D. 1960. The functional approach to the study of attitudes. *Public Opinion Quart.* **24**(2) 163–204.

Kirmani, A., A. R. Rao. 2000. No pain, no gain: A critical review of the literature on signaling unobservable product quality. *J. Marketing* **64**(2) 66–79.

Kling, R. 1994. Reading "all about" computerization: How genre conventions shape nonfiction social analysis. *Inform. Soc.* **10**(3) 147–172.

Kohli, R., S. Devaraj, M. A. Mahmood. 2004. Understanding determinants of online consumer satisfaction: A decision process perspective. *J. Management Inform. Systems* **21**(1) 115–136.

Lands' End. 2008. Men's regular buttondown no iron pinpoint dress shirt. Accessed January 21, 2009, www.landsend.com.

Mulpuru, S. 2008. *The State of Retailing Online 2008*. Forrester Research and National Retail Federation, Washington, DC.

Nausoft. 2007. Plastic designer. http://www.nausoft.net/eng/products/plastic/index.html.

Nelson, P. 1970. Information and consumer behavior. *J. Political Econom.* **78**(2) 311–329.

Oliver, R. L. 1993. Cognitive, affective, and attribute bases of the satisfaction response. *J. Consumer Res.* **20**(3) 418–430.

Park, C. W., V. P. Lessig. 1981. Familiarity and its impact on consumer decision biases and heuristics. *J. Consumer Res.* **8**(2) 223–231.

Park, J. H., L. Stoel. 2000. Apparel shopping on the Internet: Information availability on US apparel merchant Web sites. *J. Fashion Marketing Management* **6**(2) 158–176.

QMS. 2007. EViews 6.0 User guide to quantitative micro software. QMS, Irvine, CA.

Regan, K. 2001. Will online clothes ever fit? *TechNewsWorld* (May 11, 2001).

Reppel, A. E., I. Szmigin, T. Gruber. 2006. The iPod phenomenon: Identifying a market leader's secrets through qualitative marketing research. *J. Product Brand Management* **15**(4) 239–249.

Resnik, A., B. L. Stern. 1977. An analysis of information content in television advertising. *J. Marketing Res.* **41**(1) 50–53.

Ringle, C. M., S. Wende, A. Will. 2005. SmartPLS 2.0M3 (beta), accessed July 31, 2008, http://www.smartpls.de.

Robey, D. 1979. User attitudes and management information system use. *Acad. Management J.* **22**(3) 527–538.

Shavitt, S. 1992. Evidence for predicting the effectiveness of value-expressive versus utilitarian appeals: A reply to Johar and Sirgy. *J. Advertising* **21**(2) 47–53.

Sismeiro, C., R. E. Bucklin. 2004. Modeling purchase behavior at an e-commerce Web site: A task-completion approach. *J. Marketing Res.* **41**(3) 306–323.

Snyder, M., K. G. DeBono. 1985. Appeals to image and claims about quality: Understanding the psychology of advertising. *J. Personality Soc. Psych.* **49**(3) 586–97.

Speier, C., I. Vessey, J. S. Valacich. 2003. The effects of interruptions, task complexity, and information presentation on computer-supported decision-making performance. *Decision Sci.* **34**(4) 771–797.

Steenkamp, J. B. E. M. 1989. *Product Quality: An Investigation into the Concept, and How It Is Perceived by Consumers*. Van Gorcum Assen, Maastricht, The Netherlands.

Stock, J., T. Speh, H. Shear. 2006. Managing product returns for competitive advantage. *MIT Sloan Management Rev.* **48**(1) 57–62.

Thomas, D. M., R. T. Watson. 2002. Q-sorting and MIS research: A primer. *Comm. Assoc. Inform. Systems* **8** 141–156.

U. S. Census Bureau. 2005. *Computer and Internet Use in the United States: 2003*. U. S. Census Bureau, Washington, DC.

U. S. Census Bureau. 2008. 2006 E-commerce multi-sector report. Accessed July 31, 2008. http://www.census.gov/eos/www/2006/2006reportfinal.pdf.

Venkatesh, V., H. Bala. 2008. Technology acceptance model 3 and a research agenda on interventions. *Decision Sci.* **39**(2) 273–315.

Vessey, I., D. Galletta. 1991. Cognitive fit: An empirical study of information acquisition. *Inform. Systems Res.* **2**(1) 63–84.

Wang, J., M. Wallendorf. 2006. Materialism, status signaling, and product satisfaction. *J. Acad. Marketing Sci.* **34**(4) 494–505.

Zeithaml, V. A., L. L. Berry, A. Parasuraman. 1996. The behavioral consequences of service quality. *J. Marketing* **60**(2) 31–46.

Zeng, M., W. Reinartz. 2003. Beyond online search: The road to profitability. *California Management Rev.* **45**(2) 107–133.