Individual Differences in Haptic Information Processing: The “Need for Touch” Scale

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Individual Differences in Haptic Information Processing: The "Need for Touch" Scale

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This research details the development of the "Need for Touch" (NFT) scale designed to measure individual differences in preference for haptic (touch) information. The 12-item NFT scale consists of autotelic and instrumental dimensions. Results are reported that support the scale's hypothesized internal structure as well as its reliability, convergent, discriminant, and nomological validity. Individual differences in chronic accessibility to haptic information across groups varying in NFT were also found in two experiments. Additionally, NFT moderated the relationship between direct experience and confidence in judgment.

For centuries, people have recognized the importance of the sense of touch. Aristotle believed that touch mediates every type of sense perception, even vision (Siegel 1970). Closer to marketing, interpersonal touch has been found to affect both attitudes and behavior and Hornik (1992) has called for more research on the role of touch. In consumer behavior, evidence has been found for individual differences in terms of preference for sensory forms of information (see Heckler, Childers, and Houston 1993 for a discussion of visual versus verbal information processing). Casual observation reveals that individuals differ greatly in the amount of touch they exhibit while shopping. Whereas some consumers touch products to simply place them in shopping carts, other consumers spend more time exploring products with their hands before ultimately making a purchase decision. It seems likely that some individuals would prefer information available through the sense of touch. To date, however, the preference for information obtained through the sense of touch has not been explored.

With the growth of various forms of nontouch media (e.g., catalog and Internet shopping), this individual difference is important to conceptualize and measure. Burke (1997) notes that shopping from home often does not provide the same level of product information or entertainment as physical stores. Peterson, Balasubramanian, and Bronnenberg (1997) emphasize that information-presentation mechanisms on the Internet may affect the way consumers search for information and their subsequent decision making. We argue that the nature and use of touch can affect these aspects of online shopping behavior. In addition, studying touch may lead to insights regarding brand judgments and choice preferences, leisure satisfaction, information search, and product attribute importance as well as the appreciation and acquisition of treasured possessions. For instance, individuals' confidence in product judgments may be affected by whether or not they can touch a product during evaluation. Attitude toward a product may also differ depending on whether a shopper has the opportunity to touch a product and experience pleasurable sensory feedback (e.g., rub a soft leather coat) before purchase. How consumption environments structure and enable the acquisition and utilization of haptic information, or prohibit it, may in turn lead to the differential utilization of available haptic attributes.[1] Some consumers are likely to become frustrated by their inability to acquire this information, causing them to forgo certain nontouch shopping environments (e.g., online shopping). Thus, assessing the differential role of haptic information among consumers can contribute to a better understanding of consumer behavior across a broad range of domains.

As a first step in exploring haptic information processing, this article develops and validates a measure of this individual difference in the "Need for Touch" (NFT). In the following sections we elaborate on the nature of touch and haptic information and develop a set of hypotheses. These hypotheses are tested by conducting seven studies. In the

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[1]Gibson (1966) adopted the term "haptics" to refer to the functionally discrete system involved in the seeking and the pickup of information by the hand. Touching with the hands (or the haptic system) has been reported to be particularly adept at encoding the material object properties corresponding to texture, hardness, temperature, and weight information (Klatzky and Lederman 1992, 1993; Lederman and Klatzky 1987).

final section we discuss the implications of our findings about this individual difference in the NFT for the understanding and study of consumer behavior.

TOUCH AND HAPTIC INFORMATION

The Motivation Component: NFT. The NFT is conceptually defined as a preference for the extraction and utilization of information obtained through the haptic system. As a preference, NFT is based on motivational versus ability differences among individuals (Johansson 1978; Spreen and Strauss 1991). This need to examine products haptically can be driven by motivations associated with what Holbrook and Hirschman (1982) describe in terms of either consumer problem solvers or consumers seeking fun, fantasy, arousal, sensory stimulation, and enjoyment. This dichotomy has been represented in the retail context by the themes of shopping as work (Sherry, McGrath, and Levy 1993) versus the festive perspective of shopping as fun (Babin, Darden, and Griffin 1994; Sherry 1990). In the utilitarian view, consumers are concerned with purchasing products in an efficient and timely manner to achieve their goals with a minimum of irritation. In contrast, as one consumer noted, "I enjoy looking around and imagining what one day, I would actually have money to buy. Shopping . . . is an adventure" (Sherry 1990, p. 27). This adventure reflects shopping's potential entertainment value and the enjoyment that is part of the experience versus the achievement of any prespecified end goal (Holbrook and Hirschman 1982). This dichotomy is also consistent with the psychological literature on individual differences in motivation relating to, for example, the need to achieve or the need for power (McClelland, Koestner, and Weinberger 1989).

As with prior research on scales that assess individual needs (e.g., Need for Cognition [NFC; Cacioppo and Petty 1982] and Need to Evaluate [NTE; Jarvis and Petty 1996]) we do not assume a biological basis for this individual difference, but NFT is consistent with the implicit versus self-attributed dual motivation model advocated by McClelland et al. (1989). In this dichotomy, self-attributed motives corresponding to the instrumental dimension of NFT are characterized by organized analytic thought that is initiated by an explicit goal that drives behavior. In contrast, more implicit motives represented by autotelic touch reflect compulsive and affective themes intrinsic to an activity that are not elicited by reference to unmet goals. These differences are similar to distinctions made between the conscious goal-setting nature of episodic driven motives versus those derived from semantic memory, which more automatically influence behavior without conscious effort (McClelland et al. 1989). This dual characterization of NFT from both the retail as well as the psychological literature on motivations is consistent with our perspective on the NFT as a multidimensional construct with two underlying factors, instrumental and autotelic touch, as elaborated on next.

NFT: The Instrumental Factor. The instrumental dimension of NFT refers to those aspects of prepurchase touch that reflect outcome-directed touch with a salient purchase goal. Contained within the domain of this form of touch are goal-driven evaluative outcomes related to the consumer (e.g., comfort and certainty in their judgments) as well as the target product (e.g., quality or worth). These instrumental judgments would be expected to focus on properties attuned to haptic utilization that reflect a product's texture, hardness, temperature, or weight. The image of the consumer involved in instrumental touch is that of a problem solver consciously engaged in the goal-directed activities of searching for information and arriving at a final product judgment. For instance, picking up a notebook computer and holding it in one's hand to assess its weight and deriving an inference with respect to its portability would be an example of an instrumentally driven haptic product evaluation.

NFT: The Autotelic Factor. In contrast, the autotelic dimension of NFT relates to touch as an end in and of itself. Autotelic touch involves a hedonic-oriented response seeking fun, arousal, sensory stimulation, and enjoyment (Holbrook and Hirschman 1982). Autotelic touch corresponds to the sensory aspects of product touch, with no purchase goal necessarily salient, but with spontaneous investigation of multisensory psychophysical product relationships (Holbrook and Hirschman 1982). Thus, central to defining the domain of autotelic touch are its hedonics (e.g., enjoyment and affect) and the compulsive or irresistible need to engage in exploratory variety seeking via touch (e.g., lack of control and indiscriminate processing). Evidence for the appreciation of this experiential aspect of consumer behavior is found in museums that offer multisensory environments including music and hands-on displays of sculpture (Fiore, Moreno, and Kimle 1996).

To operationalize this individual difference in NFT, we employed scale-development procedures following the guidelines suggested by Churchill (1979) and Anderson and Gerbing (1988). A series of studies are reported that assess the scale's internal structure, reliability, and relationship to a variety of consumer-behavior-related constructs. We then conduct two additional studies designed to provide a better understanding of how differences in chronic accessibility to haptic information relate to preferences in the acquisition and utilization of haptic information. Following this, we report on an experiment where NFT is shown to moderate the relationship between direct experience and confidence in judgment.

DEVELOPMENT OF THE NFT SCALE

Generation of Items

Undergraduate students (n = 135) were provided with conceptual definitions of the NFT construct and its dimensions and were asked to submit items relating to NFT, similar to the process utilized by Richins and Dawson (1992). The authors then edited the items for appropriate wording and deleted very similar items, resulting in a 50-item scale.

EXHIBIT 1

THE TWO DIMENSIONS OF NEED FOR TOUCH AND THE SCALE ITEMS

1. When walking through stores, I can't help touching all kinds of products. (A)
2. Touching products can be fun. (A)
3. I place more trust in products that can be touched before purchase. (I)
4. I feel more comfortable purchasing a product after physically examining it. (I)
5. When browsing in stores, it is important for me to handle all kinds of products. (A)
6. If I can't touch a product in the store, I am reluctant to purchase the product. (I)
7. I like to touch products even if I have no intention of buying them. (A)
8. I feel more confident making a purchase after touching a product. (I)
9. When browsing in stores, I like to touch lots of products. (A)
10. The only way to make sure a product is worth buying is to actually touch it. (I)
11. There are many products that I would only buy if I could handle them before purchase. (I)
12. I find myself touching all kinds of products in stores. (A)

NOTE.—Scale descriptors ranged from −3 (strongly disagree) to +3 (strongly agree). A = autotelic scale item; I= instrumental scale item.

Next, to assess content validity, a group of 12 undergraduate students were given construct descriptions and asked to classify the 50 items as assessing either the instrumental aspects of purchase-related touch or the autotelic aspects of touch. Ten of the items were ambiguous and were eliminated. Twenty-two of the items were classified as instrumental and 18 items as autotelic by at least 10 of the 12 evaluators.

Purification: Studies 1 and 2

The 40-item scale was administered to a sample of 135 undergraduate students to provide preliminary estimates of reliability and scale structure. The 18-item autotelic scale had a coefficient α of .93 while the 22-item instrumental scale had an α of .88. Individual scale items were then assessed by examining item-to-total correlations and results of a principal axis exploratory factor analysis with oblimin rotation leading to additional purification to 20 items. The correlation between the instrumental and the autotelic dimensions was .66, $p < .05$.

In the second purification study, the 20-item NFT scale was included in a survey that was mailed to a randomly selected sample of 746 staff members of a university. Of these, 267 were completed for a response rate of 36%. The coefficient α was .95 for the autotelic dimension and .90 for the instrumental dimension. An exploratory factor analysis using principal axis factoring yielded a two-factor solution with an average instrumental loading of .74 and an average autotelic loading of .85. The correlation between the instrumental and the autotelic dimensions was .64, $p < .05$. Additional examination of the item-level data in terms of factor loadings and cross loadings, communalities, and item-to-total correlations resulted in further reduction to 14 items (autotelic = 7 items and instrumental = 7 items).

Dimensionality and Reliability: Studies 3 and 4

In study 3, the 14-item NFT scale was administered to a random sample of 2,000 staff members at a university. We administered additional scales in order to assess the scales' validity. Questionnaires were administered via the Internet with 555 completed for a response rate of 28%.

The theoretical model specifying two latent factors underlying the NFT construct was tested by performing a confirmatory factor analysis on the variance covariance matrix using LISREL 8 (Jöreskog and Sörbom 1993). The overall fit indexes were acceptable, but examination of the item reliabilities (Fornell and Larcker 1981), significant standardized residuals, and patterns in the modification indexes indicated the need for further scale purification. This information, along with an examination of the content of the items, suggested that one each of the autotelic and instrumental items could be dropped (see exhibit 1 for a list of the 12 scale items).

To replicate the derived 12-item scale, a fourth study containing NFT and scales used in assessing validity was conducted with a new sample of university students (n = 418). To assess scale structure, a two-factor model using the variance covariance matrix was estimated using LISREL 8 (Jöreskog and Sörbom 1993). Competing measurement models were examined for a one-factor model (χ^2 = 367.4, df = 54, $p < .01$) versus a two-factor model with no correlation between the two factors (χ^2 = 128.5, df = 54, $p < .01$) versus a correlated two-factor model (χ^2 = 88.2, df = 53, $p < .01$). A two-factor model with correlated dimensions (ϕ = .64) provides a better fit relative to these competing models.

Further examination of the solution revealed that all estimates were of the proper sign and were statistically significant. The reliabilities and fit statistics were all acceptable. As noted above, the chi-square test was significant, but as Jöreskog and Sörbom (1993) note, the chi square should be regarded more as a measure of fit than as a strict test statistic, because it may not be realistic to assume that the hypothesized model holds exactly in the population. The NNFI fit index was .94 and the CFI was .96, which exceed the .90 recommendation (Bentler 1992). The RMSEA of .07 represents reasonable errors of approximation in the population and indicates a good fit (Byrne 1998), and RMR = .08. Reliability for the autotelic dimension was .89 and .87 for

TABLE 1

CONSTRUCT VALIDITY TESTS FOR NEED FOR TOUCH (STANDARDIZED STRUCTURAL EQUATION COEFFICIENTS)

	Instrumental—NFT		Autotelic—NFT		Overall NFT
Type of asssessment	Study 3	Study 4	Study 3	Study 4	Study 4
Response bias tests: Social desirability	−.05	.00	−.02	−.01	−.02
Convergent validity: Need for Tactile Input	NA	.88*	NA	.59*	.75*
Discriminant validity:					
Need for Cognition	NA	.00	NA	.03	.10
Need to Evaluate	NA	−.01	NA	.04	.05
Nomological validity:					
Experiential shopping	−.04	.01	.31*	.26*	.27*
Impulse buying	.09	.04	.24*	.23*	.28*
Catalog purchasing	−.43*	−.33*	.08	.06	−.26*
Telephone purchasing	−.37*	−.35*	−.13	.02	−.22*
Internet purchasing	−.35*	−.36*	−.08	−.03	−.30*

NOTE.—NA = not available.
*Statistically significant at $p < .05$.

the instrumental dimension (Fornell and Larcker 1981). The AVE for the autotelic dimension was .74 and .71 for the instrumental dimension, which exceeded the criterion of .50 (Fornell and Larcker 1981). As tests of discriminant validity, the squared correlation between the two dimensions ($\phi^2 = .41$) was less than the AVEs and the confidence interval around ϕ(.64 ± .22) did not contain 1.0. Across the two studies, the correlated two-factor model represents a reasonable fit of the data and reflects the theoretical structure of the items.

Construct Validity

As indicated previously, a number of measures were included in studies 3 and 4 for validity purposes. To test the predicted relationships, the coefficients were estimated using LISREL 8 (Jöreskog and Sörbom 1993). The relationship between each measure and the overall NFT scale as well as the individual paths to the autotelic and instrumental dimensions were examined and are summarized in table 1.[2]

Tests of Response Bias. The potential confounding of responses to the NFT scale by social desirability response bias was assessed, as has been advocated in consumer research (Mick 1996; Tian et al. 2001). This assessment was conducted by including the Crowne and Marlow (1964) scale in studies 3 ($\alpha = .73$) and 4 ($\alpha = .78$). Across both studies and dimensions NFT was not related as predicted with socially desirable responding (table 1). Further tests also show that social desirability did not moderate nor suppress the subsequent relationships used in assessing the construct validity of the NFT scale (Mick 1996).

Convergent Validity. Recently, Citrin, Stem, Spangenberg, and Clark (forthcoming) developed a six-item scale to measure consumer Need for Tactile Input (NTI). Although not formally defined as such, our understanding of the authors' characterization of the NTI input is that the scale is oriented toward assessing brand/product evaluations (Citrin et al., forthcoming). This suggests that the NTI domain overlaps with the instrumental dimension of the NFT scale. For example, items relate to the need to touch to evaluate product quality or to evaluate the physical characteristics of a product. This characterization is consistent with their finding that the NTI scale was negatively related to the prior purchase of products over the Internet. Thus, we expect that the NTI scale will have a higher positive relationship with the instrumental dimension of NFT versus the autotelic dimension. The NTI scale ($\alpha = .96$) was related positively to instrumental NFT ($\beta = .88$, $p < .05$, table 1) and autotelic NFT ($\beta = .59$, $p < .05$), with this difference statistically significant as predicted (chi-square equivalence test: $\Delta\chi^2 = 108.7$, $p < .05$). This supports the convergent validity of the NFT scale, while at the same time underscoring its distinction from the NTI scale in terms of our addition of individual differences in autotelic NFT.

Discriminant Validity. To assess discriminant validity we included in study 4 the NFC scale (Cacioppo and Petty 1982; 18 items, $\alpha = .87$) and the NTE scale (Jarvis and

[2]When a scale is made up of multiple dimensions, differences exist in both past practices for scale assessment as well as the theoretical origin of these practices. For example, both Richins and Dawson (1992) and Tian, Bearden, and Hunter (2001) validated scales with multiple correlated dimensions at the overall composite level, whereas Netemeyer, Burton, and Lichtenstein (1995) conducted a dimension-based analysis. Space does not permit a detailed discussion of the arguments reflecting a composite vs. dimensional analysis, and the reader is referred to Carver (1989) and Hull, Lehn, and Tedlie (1991) for additional details. We believe that the decision to pursue one research strategy over another should be based on the level of abstraction of the underlying theory and the goals of the researcher. For instance, one researcher may be interested in and have theoretical predictions as to how separate dimensions of job satisfaction differentially relate to a battery of antecedents or consequences, whereas another researcher may be interested in making predictions about the overall welfare of employees and therefore focuses on composite job satisfaction (Richard Bagozzi, personal communication with authors, June 10, 2001). For our purposes, to avoid any potential interpretational confounding and to demonstrate the merits of developing a multiple-dimensional NFT scale, we analyze our results at the dimension level and selectively at the composite level. Future researchers might choose to either employ the composite NFT scale and/or its dimensions in their investigations.

Petty 1996; 16 items, $\alpha = .79$). Although NFC, like NFT overlap in the domain of information-acquisition behavior, NFC taps this domain at a more macro level that is also not specific to the consumption context. In contrast, the NFT scale is more molecular in terms of its sense-specific focus and narrower in tapping consumption behavior. Thus, we predict the scales will not be related. Similarly, NTE represents information acquisition, but in the context of chronic evaluation. This chronic form of evaluation across such objects as social issues, groups, and future behaviors is in contrast to the product-specific nature of NFT. Evaluation represents only one aspect of the NFT, particularly when instrumental is contrasted with autotelic touch. Thus, we predict that NTE and NFT should not be related. These predictions were supported (see table 1) as neither dimension of NFT was related to NFC or NTE. Both findings support the discriminant validity of the NFT scale.

Nomological Validity. As evidence of nomological validity, we considered various direct-marketing media such as shopping via catalog, over the telephone, and on the Internet. Evidence for a "visual preview model" has been found that states that vision provides a quick glance that results in broad but coarse information about the haptic properties of an object, information that is useful in directing further processing (Klatzky, Lederman, and Matula 1993). Thus, viewing a catalog or a Web page may reveal that more detailed information about a haptic property is available, yet not readily attainable. A consumer who values this haptic information would be expected to be less likely to purchase products via marketing channels where direct product touch is prohibited. This is consistent with the findings reported by Citrin et al. (forthcoming), who found consumer need for more instrumentally oriented tactile information to be negatively related to Internet purchase behavior. For these reasons, a negative relationship is expected between purchasing via these nontouch media and instrumental NFT. Additionally, when consumers purchase via these direct media, it is more likely that they are engaged in shopping behavior with a salient purchase goal rather than for fun. However, autotelic touch is concerned with touch without a salient purchase goal. For this reason, we expect there to be no relationship between purchasing via these media and autotelic NFT.

Both study 3 and study 4 included questions that asked participants whether they purchased via catalog, over the telephone, or on the Internet (e.g., "I order products using the Internet" using a five-point scale with endpoints "never" and "very often"). As predicted, across both studies instrumental NFT was negatively related to all three forms of direct-purchase behavior, while, also as predicted, autotelic NFT was not related to the propensity to purchase products via catalog, telephone, or the Internet (table 1).

To further assess the nomological validity of NFT, the experiential motivation for shopping (Dawson, Bloch, and Ridgway 1990) was examined. Experiential shopping relates to social or recreational motivations rather than to purchase products. In other words, this is shopping for the sake of the "experience" and would be driven more by the desire for fun rather than to acquire information about, evaluate, or purchase a product. Hence, we expected that experiential shopping would relate positively with autotelic NFT and not be significantly related to instrumental NFT. Both studies 3 and 4 included the experiential shopping motivation scale (Dawson et al. 1990; α's = .86 and .87). For the NFT subscales, the autotelic dimension was, as predicted, significantly related to the experiential motivation for shopping (β's = .31 and .26, $p < .05$; table 1), but not related to instrumental NFT (β's = −.04 and .01, $p > .05$).

The final assessment of nomological validity examined the relationship between buying impulsiveness and NFT. Buying impulsiveness (Rook and Fisher 1995) is defined as a consumer's tendency to buy spontaneously, unreflectively, immediately, and kinetically. "Highly impulsive buyers are more likely to experience spontaneous buying; their shopping lists are more 'open' and receptive to sudden, unexpected buying ideas" (Rook and Fisher 1995, p. 306). In this sense, the impulse purchase trait is characterized by the lack of a salient purchase goal, at least at the start of the shopping experience. Because autotelic NFT is more spontaneous and also characterized by a nonsalient purchase goal, it is expected that buying impulsiveness will be positively related to autotelic NFT. However, because instrumental NFT is more reflective and concerns a salient purchase goal, it is expected that buying impulsiveness will be unrelated to instrumental NFT. Included in the questionnaires for studies 3 and 4 was the nine-item buying impulsiveness trait scale (Rook and Fisher 1995; α's = .90, .88). The relationship between buying impulsiveness and autotelic NFT was significant and positive (β's = .24 and .23, $p < .05$, table 1), as predicted. Additionally, the relationship between buying impulsiveness and instrumental NFT was insignificant (β's = .09 and .04, $p > .05$), again confirming our predictions.

Summary and Discussion of Construct Validity Results

The first set of studies detailed the development and initial assessment of the NFT individual difference scale. The NFT scale was purified and a measurement model was specified based on several considerations. These analyses suggest that the NFT scale has two dimensions with desirable levels of reliability, while not being confounded by social desirability bias.

Convergent validity was supported by the relationship between instrumental NFT and the newly developed NTI scale (Citrin et al., forthcoming). The finding that the NTI scale differentially correlated with the autotelic versus instrumental dimension of NFT underscores the importance of incorporating both dimensions within the NFT scale. Discriminant validity of NFT was also supported through the absence of a relationship between the dimensions of NFT and both NFC and NTE.

Nomological validity of the scale was supported through several predicted relationships. Purchasing via direct media was negatively related to instrumental NFT but not related to autotelic NFT. Buying impulsiveness was positively related to the autotelic dimension of NFT, but not the instrumental dimension. Additionally, experiential shopping (Dawson et al. 1990) was positively related to autotelic NFT and unrelated to instrumental NFT.

The first set of studies provided strong support for the psychometric properties of the NFT scale. One important issue not addressed in these studies concerns why individuals might differ in their preference for haptic information. Underlying our premise for individual differences in haptic information preferences is a greater accessibility to haptic information for those higher versus lower in NFT. To empirically examine this premise, the following two studies were conducted.

NFT AND CHRONIC ACCESSIBILITY

Understanding the Nature of NFT

As defined previously, NFT is based on a preference for the extraction and utilization of information obtained through the haptic system. An underlying issue is the basis for this preference for haptic information, which we predict stems from a differential accessibility to haptic information for higher versus lower NFT. We propose that this differential accessibility is based on the chronic accessibility of stored haptic information by those varying in NFT. In this sense, chronic or long-term accessibility refers to an activation readiness potential of stored information and reflects long-term processing influences on activation (Higgins 1996). In the person perception literature, evidence has shown a relationship between individual differences in the chronic accessibility of particular constructs and differences in responding to stimuli (e.g., Higgins and Brendl 1995; Higgins, King, and Mavin 1982).

We conjecture that persons higher in NFT are more likely to have haptic information accessible and to seek haptic information and to use it as they form judgments. Consistent with this view is that chronics on a particular construct are individuals who list in a free recall task construct relevant information sooner than do nonchronics (Higgins et al. 1982). In the attitude literature, salient beliefs are accessible beliefs and are related to attitude toward an object. These beliefs are also commonly elicited as the first two or three beliefs in a free recall exercise (Fishbein and Ajzen 1975). Consequently, if haptic information is more chronic in its accessibility for those higher in NFT, we would expect that persons higher in NFT will access touch related attributes sooner and faster than those lower in NFT.

Chronic Accessibility and Thought Verbalizations: Study 5

Overview. This experiment consisted of two factors based on a median split of the NFT scale and two products containing salient haptic attributes. To induce a goal that would reflect more of a prepurchase task orientation, subjects were asked to evaluate products while concurrently verbalizing their thoughts. Consistent with past research is the prediction that if higher NFT individuals act as chronic processors of haptic information, then they should attend to and verbalize haptic attributes earlier in their protocol than those lower in NFT (Higgins et al. 1982). We also predict that as an individual difference advantage in accessibility, results should replicate across the two products.

Stimuli A sweater and tennis racket were chosen through a pretest as products possessing salient haptic information. Forty-eight undergraduate students rated 15 products in terms of whether touch played an important role in their decision process on a seven-point scale (1 = touch is not important at all to 7 = touch is extremely important). The mean importance of touch in the decision to purchase was rated as equal for the two products (sweater: $M = 6.4$ vs. tennis racket: $M = 6.2$, $p > .05$).

Sample and Procedure. One hundred and seventy five undergraduate students recruited from marketing classes individually evaluated the products sequentially while their concurrent verbal protocols were audiotaped. A verbalization warm-up procedure was used for a pen. Following this, either the sweater or the tennis racket was positioned on a raised table (order was counterbalanced). Following the product examinations, participants filled out the NFT scale. After completion, they were asked whether they knew the purpose of the study. No participant realized that the focus of the study was to assess their haptic processing.

Independent Variables. The 12-item NFT scale was used to assess individual differences in haptic information processing (reliability overall NFT = .92; instrumental $\alpha = .90$; autotelic $\alpha = .95$). The entire range of the scale from -36 to 36 was represented in the sample. Higher and lower NFT was determined by a median split with 84 subjects scoring greater (lower) than the median of 11.5 categorized as higher (lower) in NFT. The correlation between the autotelic and instrumental dimensions of NFT was .63, $p < .05$.

Dependent Measures: Accessibility of Haptic Information. Ninety-six pages of verbal protocol were transcribed for the 175 subjects. Each statement was classified according to whether or not it related to an assessment of the product's haptic properties (DeLong, Bye, and Larntz 1991). Examples of haptic comments would be statements related to the feel or softness of the fabric or the weight of the tennis racket. To evaluate the coding system, an experimenter and an independent judge coded the first 10 subjects (250 separate statements), and agreement was 98%. Consistent with Higgins (1996), our measure of accessibility was based on the ordering of haptic versus nonhaptic thought verbalizations. Specifically, the measure allows for a differential number of thoughts and weights the order of thoughts by the reverse of the number of thoughts. For instance, if a person verbalized 5 total thoughts and the first and third were haptic related, the numerator would be 8 (5 + 3) and the denominator would be 15 (5 + 4 + 3 + 2 + 1) for a weighted haptic accessibility measure of .67.[3] The index is scored so such that higher values correspond to haptic thoughts occurring earlier in the evaluation process.

Results: Haptic Thoughts and NFT. Consistent with our chronic accessibility explanation, individuals higher in NFT utilized haptic information earlier in their product evaluations than their lower NFT counterparts. For the sweater, individuals higher in NFT verbalized haptic attribute information sooner than those lower in NFT ($M = .46$ vs. $M = .30$, $t(82) = 3.6$, $p < .05$). This pattern of results also occurred for the tennis racket when comparing higher versus lower NFT ($M = .33$ vs. $M = .22$, $t(86) = 2.8$, $p < .05$). This same pattern of results also occurred at the dimension level.

Discussion of Study 5

Across both products, results indicate that haptic information is more chronically accessible to subjects who scored higher on the NFT scale versus those scoring lower on the scale. People higher in NFT mentioned haptic attribute information earlier in their evaluations than those lower in NFT, supporting greater accessibility of haptic information for the former. In study 5, subjects were instructed to evaluate the two products, thereby inducing a more purchase- versus shopping-oriented type of processing goal (Babin et al. 1994). However under more experiential-oriented shopping where a prespecified end purchase goal is not induced (Holbrook and Hirschman 1982), we would expect a more spontaneous autotelic form of touch to be more prevalent. For example, an individual high in autotelic NFT, though not intending to personally make a purchase, may accompany a friend who is looking for clothes. The individual while browsing through a clothing store may spontaneously reach out a hand and suddenly notice a sweater's unexpected softness. This example of a more spontaneous compulsive form of haptic processing is one of our key distinctions between autotelic and instrumental touch. The next study extends study 5 results by examining differences in spontaneous chronic accessibility across sets of haptic and nonhaptic stimuli between those higher versus lower in autotelic versus instrumental NFT.

Chronic Accessibility and Spontaneous Haptic Processing: Study 6

Accessibility and Autotelic versus Instrumental Touch. As our results in the previous study suggest, increased accessibility of haptic attributes when evaluating products is based on an individual preference for haptic information. However, this product-evaluation task does not distinguish between the more goal-driven utilitarian form of instrumental touch versus the spontaneous-enjoyment-oriented autotelic form of touch. Under conditions where consumers do not possess a purchase-oriented processing goal, we would expect more of a bottom-up or stimulus-driven form of touch that should lead to a chronic accessibility advantage for individuals higher in autotelic versus instrumental touch.

Support for an autotelic NFT advantage when a salient purchase goal does not exist comes from both the developmental literature and the conceptual nature of these two forms of haptic processing. McClelland et al. (1989) noted that implicit motives are acquired earlier in life on the basis of prelinguistic affective experiences versus self-attributed instrumental motives that are based on explicit acquisition of values or goals important for later childhood and adult achievement. Similarly in their review, Bushnell and Boudreau (1991) conclude that infants perceive the material property of texture as early as five to nine months of age. By this age, infants exhibit preferential behavior for autotelic touch by stroking textured objects that provide pleasurable tactile feedback. In contrast, more functional haptic touch develops later (eight to nine months). Thus, there is a primacy in the development of more autotelic versus more functional interactions with haptic object properties (Bushnell and Boudreau 1991). Additionally, our conceptualization of autotelic touch is also consistent with McClelland et al.'s (1989) discussion of the compulsive nature of an implicit motive. As a spontaneous behavior without a salient purchase goal, autotelic touch, like an implicit motive, is a less effortful automatic process that is not consciously controlled and is more driven by the presence of a triggering stimulus (Bargh 1984). These characteristics are also reflective of impulsive behavior (Rook and Fisher 1995) and, as our previous studies show, autotelic but not instrumental touch is positively related to impulse-buying behavior. Thus, we predict that absent a purchase goal, individuals higher (lower) in autotelic touch will access haptic information faster (slower) than individuals higher versus lower in instrumental touch. The next experiment directly addresses this issue while providing an additional test of our chronic accessibility explanation for individual differences in NFT.

Overview. To induce a task that lacked a purchase-oriented goal, we had subjects perform a lexical decision task (Rubenstein, Lewis, and Rubenstein 1971) using reaction-time methodology. Study 6 was a two (levels of NFT: between) × three (text stimulus: within) × 10 (trials: within) mixed factorial design. It was expected that under the stimulus-driven nature of this task, for individuals higher versus lower in autotelic NFT, their chronic accessibility of haptic information would lead to shorter reaction times for haptic words, but not for nonhaptic words or nonwords. However, we condition this effect by an additional interaction with the trials manipulation. By its nature, chronic accessibility represents an individual's activation readiness of stored information (Higgins 1996). Thus, higher compared to lower autotelic NFT should demonstrate a reaction-time advantage for haptic words initially, but this advantage should dissipate

[3]We thank one of the reviewers for suggesting this index of haptic thought accessibility.

in later trials. Once those lower in autotelic NFT have accessed the haptic information, they should also possess an activation readiness on subsequent trials and should demonstrate equal accessibility with higher autotelic NFT. We also predict no interaction with trials for nonhaptic words or nonwords. Given that the task does not induce a salient purchase-oriented goal, we predict no differences in this pattern of effects for individuals higher versus lower in instrumental NFT.

Procedure One hundred university students participated in the study for extra credit from a psychology department subject pool. On entering the research lab, subjects signed a consent form and completed a questionnaire that contained the NFT scale. Subjects then received instructions for the lexical decision task. They were informed that text in the form of English language words and nonwords would be presented one at a time on a computer screen and to identify if a stimulus was a word by pressing the appropriate key. They were instructed to proceed through the screens as fast as possible, but to be accurate as well. Subjects first completed a practice trial using different test stimuli and then proceeded to the first of 10 additional trials administered on the computer. Following completion, subjects were thanked and debriefed.

Independent Variables. The stimuli consisted of a combination of 30 words and nonwords. Ten nonhaptic words, 10 pronounceable nonwords, and 10 haptically related words were selected from an initial pretest. In the pretest, 10 subjects assessed 106 words comprising a mixture of nonhaptic, haptic, and pronounceable nonwords, the latter drawn from studies conducted by Rubenstein et al. (1971). Subjects were to indicate whether they associated the words/nonwords with any combination of their five senses by placing an *X* under the options designated as sight, smell, touch, hearing, taste, or "none of these." From these responses, 10 nonwords were selected using the criterion that at least nine of the 10 subjects had to indicate that it was not related to the five senses. Similarly, at least nine of 10 subjects had to rate a word to be associated with touch to generate the 10 haptically related words. Nonhaptic words were selected such that the words were not to be haptically related, with majority category ratings ranging from taste (three words), smell (one word), sight (two words), and "none of these" (four words). This resulted in the selection of the following: 10 haptic words ("rough," "grasp," "scratchy," "smooth," "firmness," "hold," "coarse," "squeeze," "soft," and "grip"), 10 nonhaptic words ("sugar," "task," "debt," "tray," "wine," "lock," "grass," "salad," "hour," and "fate"), and 10 pronounceable nonwords ("hosk," "pronk," "staim," "rolt," "groot," "blesp," "trene," "sneap," "tors," and "slint"). The stimuli were displayed individually on the computer screen in 72-point bold Helvetica font. Following each text stimulus was a filled oval that masked the presentation area for 1.5 sec. The stimuli were presented in four randomly selected orders that were counterbalanced across treatments.

Each of the 10 trials consisted of responses to the 30 text stimuli. At the end of each trial, a page was inserted that instructed subjects to "press any key" when they were ready to begin. This allowed subjects a short rest between trials before proceeding at their own pace through the 10 trials.

Need for Touch was measured with the 12-item scale (overall reliability = .93; instrumental $\alpha = .90$; autotelic $\alpha = .92$). Lower and higher autotelic (instrumental) NFT were determined by median splits, with 53 (56) subjects scoring above the median of 3 (4) classified as higher along each NFT dimension. The correlation between the autotelic and instrumental dimensions was .72, $p < .05$.

Dependent Measures. In the lexical decision task, subjects were instructed to press a computer key based on whether the text was a word or a nonword. The keys ("z" or "/") were counterbalanced for the correct answer. The response time in milliseconds served as the dependent variable. In total, subjects provided 300 responses across the 10 trials, averaging 95% correct responses; differences across treatment groups were of no consequence (correlations with treatments ranged from .04 to .09, $p > .05$). Given the sample size and nature of reaction times the square root of reaction time was used as the dependent variable as recommended by Hair, Anderson, Tatham, and Black (1998). Actual reaction times are used when discussing the results.

Overview of Results. There are a number of basic effects that are significant and consistent with the nature of the study. We provide an overview of these results first, before addressing the NFT-related results. There are significant differences between the text stimuli ($F(2,97) = 51.7$, $p < .05$) with longer reaction times for nonwords ($M = 573$ msec) than either nonhaptic ($M = 518$ msec) or haptic words ($M = 513$ msec). There is also a main effect for trials ($F(9,90) = 31.1$, $p < .05$). As would be expected, there is a learning effect with longer reaction times at trial 1 ($M = 780$ msec) and a steady decline in subsequent trials (e.g., trial 10; $M = 411$ msec). There is no overall significant difference between the NFT groups (lower NFT: $M = 536$ msec vs. higher NFT: $M = 533$ msec, $F(1,98) = .001$, $p > .05$). This applies to the NFT dimensions as well (higher autotelic: $M = 527$ msec vs. lower autotelic: $M = 543$ msec, $F(1,98) = .6$, $p > .05$; higher instrumental: $M = 535$ msec vs. lower instrumental: $M = 534$ msec, $F(1,98) = .01$, $p > .05$).

Accessibility of Haptic Information. It was expected that for individuals higher versus lower in autotelic NFT, their chronic accessibility of haptic information would lead to shorter reaction times for haptic words, but not for nonhaptic or nonwords. There is a marginally significant three-way interaction ($F(18,81) = 1.7$, $p = .06$) between autotelic NFT, text stimuli, and trials, but not for instrumental NFT ($F(18,81) = .7$, $p > .05$). However, more important is the pattern of this interaction. One primary comparison is the expected significant difference ($F(1,98) = 2.1$, $p < .05$) between higher (727 msec) versus lower autotelic NFT

(841 msec) for haptic words for the first trial. Thus, there is a 114 msec advantage in the speed of access for those higher in autotelic NFT for haptic words. In contrast, as expected, no significant differences exist between higher and lower autotelic NFT for nonhaptic words (M's = 701 msec and 752 msec, respectively, $F(1,98) = 1.0, p > .05$) or nonwords (M's = 792 msec and 874 msec, respectively, $F(1,98) = 1.4$, $p > .05$). The advantage for higher versus lower autotelic NFT in accessibility for haptic words disappeared on the second trial (higher: 606 msec vs. lower: 586 msec, $F(1,98) = .7, p > .05$) and persisted for the other text stimuli (nonhaptic words, higher: 576 msec vs. lower: 589 msec, $F(1,98) = .5$, $p > .05$; and nonwords, higher: 665 msec vs. lower: 669 msec, $F(1,98) = .1, p > .05$). This equal accessibility for all text stimuli continued through the tenth trial (haptic words, higher: 372 msec vs. lower: 408 msec, $F(1,98) = 1.2, p > .05$; nonhaptic words, higher: 398 msec vs. lower: 424 msec, $F(1,98) = 1.0, p > .05$; and nonwords, higher: 410 msec vs. lower: 459 msec, $F(1,98) = 1.4$, $p > .05$). Identical tests for instrumental NFT did not reveal any significant differences in reaction times by type of text across the trials. There was no significant difference between higher (769 msec) vs. lower instrumental NFT (794 msec, $F(1,98) = .4$, $p < .05$) for haptic words for the first trial. There were also no significant differences across higher and lower instrumental NFT for nonhaptic words (M's = 727 msec and 723 msec, respectively, $F(1,98) = .1$, $p > .05$) or nonwords (M = 830 msec and 832 msec, respectively, $F(1,98) = .03, p > .05$). This same pattern of effects persisted for all subsequent trials.

Results support our chronic accessibility explanation by demonstrating an initial spontaneous reaction-time advantage for higher versus lower autotelic NFT for haptic words, but a lack of advantage in subsequent accessibility. Our results also show that under a non-purchase-oriented goal this reaction-time advantage does not occur for individuals higher in instrumental NFT. On the one hand, results are consistent with study 5 in supporting our chronic accessibility explanation for preferences in NFT. However, in contrast to the previous study, by varying the task, we demonstrate in the current study a more automatic form of chronic accessibility for autotelic touch. We return to a discussion of this issue in the conclusions section. Before that, we examine whether NFT will moderate judgments under conditions where consumers are able to directly experience products or because of distribution channel or merchandising reasons (e.g., displays or packaging) touch is not permitted.

NFT AND DIRECT PRODUCT EXPERIENCE

Direct Experience and NFT: Study 7

Direct experience with an object has been reported to increase confidence in judgment (Smith and Swinyard 1983). For example, Smith and Swinyard (1988) found that product-belief strength and confidence were greater after direct product experiences than after exposure to advertising. However, Wright and Lynch (1995) maintain that confidence in judgment may not necessarily be greater after direct experience but depends on the type of attribute information communicated. Their "media congruence" hypothesis distinguishes between search and experience attributes. Briefly, consumers can acquire search-attribute information (e.g., the brand name or the color of a sweater) from secondhand sources such as product descriptions or advertising without directly trying (or touching) a product. In contrast, experience attributes (e.g., the feel of a sweater) can be ascertained only by use (or possibly touch) because they are dependent on subjective experience. Wright and Lynch (1995) found that direct product experience is best suited to experience attributes, whereas printed material (such as advertising) is best suited to search attributes.

In certain retail scenarios, such as shopping on the Internet, a consumer has no direct opportunity to experience a product through touch before purchasing via these media. In addition, in-store obstacles such as retail display cases preclude or diminish the opportunity to directly experience a product through touch. Using a media congruence (Wright and Lynch 1995) argument, a sweater, which we argue possesses experience attributes, should best be evaluated by touch. However, we propose that NFT will moderate this relationship.

Results from the prior two studies support the premise that individuals who are more internally motivated (higher NFT) to examine the haptic attributes of a product have greater memory accessibility to haptic information. Past research has demonstrated that as information accessibility increases, the likelihood that this information will be used as input for judgment and choice also increases (e.g., Higgins and Brendl 1995; Lingle and Ostrom 1979). This would suggest that for a product salient in haptic attributes (such as a sweater), higher NFT individuals would be more confident in their judgment when they can, versus cannot, directly touch the product. In contrast, lower NFT individuals' confidence in their judgments should be less affected by the lack of opportunity to actually touch a product high in experience attributes, and these individuals will likely be content just to visually examine the product (Klatzky et al. 1993).

Overview of Study. The purpose of study 7 was to experimentally assess the moderating effects of NFT on direct experience and product evaluation. Study 7 was a 2 (levels of NFT) × 2 (direct product experience) between-subjects factorial design.

Independent Variables. Direct experience with the product was operationalized as either a barrier or no barrier to touch. In the no-barrier condition, the sweater was folded on a table with the subject able to touch the product if they desired. In the barrier-to-touch condition, the sweater was similarly displayed but placed under Plexiglas simulating a retail display case.

Need for Touch was measured with the 12-item scale (overall reliability = .95; instrumental α = .89; autotelic α = .94). Lower versus higher NFT were determined by a median split with the 29 subjects scoring above the median (a score of one) classified as high NFT. The correlation between the autotelic and instrumental dimensions was .74, $p < .05$.

Procedure and Stimulus. Sixty subjects were informed they were needed for a study on product evaluation. In the first phase, subjects completed a multipart questionnaire that included the NFT scale and then signed up for a second phase that occurred at least five weeks later. This time period was used to disassociate the two parts of the study, which was confirmed in interviews with the participants following the study. Two of the 60 subjects failed to return for the second phase, resulting in a sample size of 58. Individually tested subjects were asked to evaluate the product with either no opportunity to touch (displayed under Plexiglas) or full opportunity to touch (sitting on a table). After evaluating the sweater, subjects filled out a measure of confidence in their judgment.

The sweater used in study 5 was also used in this experiment. The sweater had a fictitious but neutral brand name (Baxter), which was also determined by a pretest. A written description, adapted from a Land's End catalog described the sweater's construction, fabric, and available sizes.

Dependent Measures. Confidence in judgment was measured by using two seven-point scales ("not very confident" to "very confident" and "not very sure" to "very sure"). An overall confidence measure was calculated by taking the mean of the two items (r = .97).

Results. There was the predicted significant interaction between NFT and direct experience ($F(1,54) = 5.02$, $p < .05$). Consistent with expectations, individuals higher, but not lower, in NFT had more confidence in their judgment of the product when they actually touched the sweater. Higher NFT subjects who directly experienced the product had more confidence in their judgment than those higher in NFT in the barrier-to-touch (retail case) condition (M's = 6.25 vs. 5.15, $F(1,54) = 21.05$, $p < .05$). For individuals lower in NFT, confidence in judgment was not dependent on whether they were able to actually touch the sweater (M's = 5.71 and 5.67, $F(1,54) = .40$, $p > .05$).[4]

[4]At the dimensional level, higher autotelic NFT individuals who directly experienced the product had more confidence in their judgment than those in the barrier-to-touch condition (M = 6.2 vs. 5.2, $F(1,54) = 7.8$, $p < .05$). For those lower in autotelic NFT, confidence in judgment was not dependent on touching the sweater (M's = 5.8 and 5.7, $F(1,54) = .30$, $p > .05$). This pattern of results also occurred for individuals who differed in instrumental NFT (higher instrumental touch: M = 6.2 vs. lower instrumental no touch: M = 4.8, $F(1,54) = 18.2$, $p < .05$; and lower instrumental touch: M = 5.8 vs. lower instrumental no touch: M = 5.9, $F(1,54) = .15$, $p > .05$). In conducting the latter analyses, one concern was whether several of the instrumental items that contained confidence in their wording perhaps artificially inflated the relationship with attitude confidence. Additional analyses were conducted by partitioning the dimension into parcels for items that did vs. did not share this wording. Results were identical across the parcels supporting the robustness of the findings as reported.

Discussion of Study 7

Study 7 tested predictions concerning the interaction between NFT and the opportunity to obtain haptic information through direct experience. When individuals could directly experience a product by touch during evaluation, confidence in their product judgment was greater for higher, but not for lower NFT individuals. Since haptic information is preferred by higher NFT individuals, there is no substitute for directly experiencing this haptic information. While lower NFT subjects' confidence judgments did not change across barrier conditions, higher NFT subjects were more confident when they could touch to evaluate the product. Need for Touch was found to moderate the media-congruence relationship. If a product contains salient haptic information, higher NFT individuals have a need to experience the product directly. In contrast confidence for those lower in NFT is attained through a visual examination of the product. In essence, the same attribute could be considered an experience attribute for those higher in NFT, while a search attribute for those lower in NFT.

CONCLUSIONS AND IMPLICATIONS FOR FUTURE RESEARCH

Synthesis of Results across Studies

Evidence has been provided for an individual difference in preference for haptic information. A 12-item NFT scale was developed and its psychometric properties empirically assessed in a set of studies (studies 1–4). The scale possessed the hypothesized two-factor structure, demonstrated high reliability, and was found to systematically adhere to a battery of theoretically grounded relationships. Additional results showed that for those higher in NFT, the lack of direct experience through a barrier to touch resulted in less confidence in their judgment. Elevated confidence through direct experience did not occur for those lower in NFT (study 7). Haptic information was also found to be more chronically accessible for those higher in NFT as measured by both order of thoughts elicited during product evaluation and in performing a haptic related reaction-time task (studies 5 and 6). Results vary, however, across the autotelic and instrumental dimensions, an issue we turn to next.

Accessibility for Autotelic and Instrumental NFT

Our research demonstrates (studies 5 and 6) that individuals higher in NFT are more likely to chronically access haptic information. Using thought verbalizations, those higher in both autotelic and instrumental NFT mentioned haptic information sooner than individuals lower on these dimensions. In study 6, we found that those higher in autotelic NFT demonstrated faster access to haptic information, whereas this did not occur for instrumental NFT. One key difference between these two studies was the nature of the task. In study 5 individuals evaluated products, which elicited a more purchase-oriented form of processing. In contrast, in study 6 the task was to identify words where no evaluation or purchase motivation was present. Results from both studies support our premise of chronic accessibility for NFT, but qualitative differences exist in the nature of autotelic versus instrumental haptic processing. Our premise is that autotelic processing is more automatic and spontaneous, whereas instrumental processing is a more controlled and a more conscious process. Although our results reflect this distinction, more research is needed to directly examine these differences in the nature of chronic accessibility of haptic information. For instance, Bargh (1984) has described a set of criteria for differentiating automatic from controlled processes, including the manipulation of processing capacity, the salience of stimuli, and the consistency of information. For the latter, it has been reported that consistent personality traits for those possessing chronic accessibility to related categories were processed automatically, whereas inconsistent traits were processed in a more controlled conscious fashion (Bargh, Thein, and Friedman 1983). Additional research of this nature would be useful in furthering our understanding of individual differences in the processing of autotelic and instrumental information.

NFT: Attention and Memory

As our research demonstrates, haptic information is more chronically accessible to touch-oriented individuals. Thus, higher NFT individuals are able to more readily retrieve this type of information from memory. Related to this is the interplay between memory and attention and how this relationship may also play a role in differentiating between individuals who vary in NFT. For instance, research involving an individual's visual versus verbal style of processing (Heckler et al. 1993) reported a person's preference to engage in a type of processing has attentional as well as working memory implications. This may indicate that persons higher in NFT are also more likely to attend to haptic information than are their lower NFT counterparts. In addition, the differential haptic accessibility for higher compared to lower NFT individuals may indicate that higher NFT individuals are more likely to form richer mental product representations, which include haptic properties in memory. Research needs to be conducted on the nature of the memory system for haptic information and the mechanisms for its encoding and retrieval. Included in the latter are the role that cognitive elaboration strategies play in affecting the salience of haptic information and whether this facilitates or inhibits the utilization of information available through other sensory forms of input. It is not clear from past research (Schiff and Oldak 1990; Welch and Warren 1980) whether haptic forms of information might differentially affect (either facilitate or inhibit) the use of other perceptual sense-based forms of information (e.g., smell or sounds), particularly for individuals who are less reliant on (lower NFT consumers) versus consumers that are more attuned to haptic information.

Haptics and Product Design

Haptics also has implications for the area of product design and development. Consideration of haptics is being used to revolutionize the design of automobiles with tactile feedback components emerging. For example, BMW's new flagship 7 Series includes an iDrive user interface, designed by Immersion Corporation, that consolidates control of over 700 functions in one knob. iDrive "provides complex sensations that let practiced users tunnel through multiple menus without looking at the display. For example, when scrolling down a phone list the knob will emit a tactile 'bump' whenever a name is passed to give the operator a sense of speed and location" (Whitfield 2002, p. 37). The primary goal of iDrive is to reduce driver distraction through the transfer of some information load from the visual to the tactile system. This may be differentially suitable for high versus low NFT individuals. According to resource-matching theory (Anand and Sternthal 1987), optimum processing is attainable when the resources allocated to a task match those required for the task. High NFT consumers have haptic information accessible while using less of their cognitive capacity processing the haptic information and may more easily adapt to the iDrive. However, low NFT may initially have to expend additional resources focusing on the tactile information and be even more distracted from visual information. It is possible that designs with tactile feedback may be differentially preferred by, and differentially effective for, high versus low NFT consumers.

A way to address this may be to encourage high and low NFT consumers to have input into the product-design process. The use of visual imagery in the product-design process has been found to influence the customer appeal of a design of a new product (Dahl, Chattopadhyay, and Gorn 1999). Perhaps high and low NFT individuals differentially image haptic-based product information. How haptic-based mental imagery affects the accessibility of different types of product representations may provide insights into the product-design process.

Compensation for Haptic Information

With the growth of online shopping, the consequences of an inability to touch on product evaluations are important to understand. Brand names, low prices, or other nonhaptic compensation mechanisms (Kirmani and Rao 2000) may signal both high and low NFT shoppers to forgo product touch before purchase. However, barriers to touch inhibit the use of haptic information and consequently decrease confidence in product evaluations for high NFT, but not low NFT, individuals. This raises the question of how to compensate for haptic information when touch is unavailable. Concrete haptic written descriptions and visual depictions of products can partially enhance acquisition of certain types of touch information (Peck and Childers 2003). In addition, devices to provide haptic information have been developed (e.g., Logitech iFeel mouse) to attempt to provide haptic information when it is unavailable (Burdea 1996). However, are these devices more effective at compensation for low versus high NFT individuals? This is an important area for consumer research. Additionally, the haptic interfaces developed are still crude relative to direct haptic exploration, and the sense of touch is thought to be the most complicated sense to replicate (*Moneyline* 2000). Until then, mechanisms for compensating for an inability to touch products are important to investigate.

As this article asserts, it is clear that much more research is needed in the domain of product touch. Not only is there an individual difference in the preference for haptic information, but also different situations may motivate shoppers to want to touch before purchase and for different types of products. How these factors impact the study of consumer touch can now be assessed by the incorporation in future research of individual differences in the motivation to acquire and utilize haptic forms of product information.

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REFERENCES

Anand, Punam and Brian Sternthal (1987), "Strategies for Designing Persuasive Messages: Deductions from the Resource Matching Hypothesis," in *Cognitive and Affective Responses to Advertising*, ed. Patricia Cafferata and Alice Tybout, Lexington, MA: Lexingon Books, 135–159.

Anderson, James C. and David W. Gerbing (1988), "An Updated Paradigm for Scale Development Incorporating Unidimensionality and Its Assessment," *Journal of Marketing Research*, 25 (2), 186–192.

Babin, Barry J., William R. Darden, and Mitch Griffin, (1994), "Work and/or Fun: Measuring Hedonic and Utilitarian Shopping Value," *Journal of Consumer Research*, 20 (4), 644–656.

Bargh, John A. (1984), "Automatic and Conscious Processing of Social Information," in *Handbook of Social Cognition*, Vol. 3, ed. Robert Wyer, Jr. and T. Srull, Hillsdale, NJ: Erlbaum, 1–44.

Bargh, John A., Roman Thein, and Richard S. Friedman (1983), "Category Accessibility and Perceptual Hypotheses: Consequences for the Attentional Selection, Recall, and Use of Category-Consistent and Inconsistent Person Information," working paper, Department of Psychology, New York University, 10003.

Bentler, Peter M. (1992), "On the Fit of Models to Covariances and Methodology," *Psychological Bulletin*, 112 (3), 400–404.

Burdea, Gigore C. (1996), *Force and Touch Feedback for Virtual Reality*, New York: Wiley.

Burke, Raymond R. (1997), "Do You See What I See? The Future of Virtual Shopping," *Academy of Marketing Science*, 25 (4), 352–360.

Bushnell, Emily W. and J. Paul Boudreau (1991), "The Development of Haptic Perception During Infancy," in *The Psychology of Touch*, ed. Morton A. Heller and William Schiff, Hillsdale, NJ: Erlbaum, 139–161.

Byrne, Barbara M. (1998), *Structural Equation Modeling with LISREL, PRELIS, and SIMPLIS: Basic Concepts, Applications, and Programming*, Mahwah, NJ: Erlbaum.

Cacioppo, John T. and Richard E. Petty (1982), "The Need for Cognition," *Journal of Personality and Social Psychology*, 42 (1), 116–131.

Carver, Charles (1989), "How Should Multifaceted Personality Constructs Be Tested? Issues Illustrated by Self-Monitoring, Attributional Style, and Hardiness," *Journal of Personality and Social Psychology*, 56 (4), 577–585.

Churchill, Gilbert A., Jr. (1979), "A Paradigm for Developing Better Measures of Marketing Constructs," *Journal of Marketing Research*, 16 (February) 64–73.

Citrin, Alka, Donald Stem, Jr., Eric Spangenberg, and Michael Clark (forthcoming), "Consumer Need for Tactile Input: An Internet Retailing Challenge," *Journal of Business Research*.

Crowne, Douglas R. and David Marlowe (1964), *The Approval Motive*, New York: John Wiley.

Dahl, Darren W., Amitava Chattopadhyay, and Gerald J. Gorn (1999), "The Use of Visual Mental Imagery in New Product Design," *Journal of Marketing Research*, 26 (1)18–28.

Dawson, Scott, Peter H. Bloch, and Nancy M. Ridgway (1990), "Shopping Motives, Emotional States, and Retail Outcomes," *Journal of Retailing*, 66 (Winter), 408–427.

DeLong, Marilyn Revell, Elizabeth Kersch Bye, and Kinley Larntz (1991), "Perceptions of Successful Apparel Products," *Home Economics Research Journal*, 19 (3), 245–251.

Fiore, Ann Marie, Josephine Maria Moreno, and Patricia A. Kimle (1996), "Aesthetics: A Comparison of the State of the Art Outside and Inside the Filed of Textiles and Clothing. III. Appreciation Process, Appreciator and Summary Comparisons," *Clothing and Textiles Research Journal*, 14 (3), 169–184.

Fishbein, Martin and Icek Ajzen (1975), *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*, Reading, MA: Addison-Wesley.

Fornell, Claes and David F. Larcker (1981), "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error," *Journal of Marketing Research*, 18 (1), 39–50.

Gibson, James J. (1966), *The Senses Considered as Perceptual Systems*, Boston: Houghton Mifflin.

Hair, Joseph Jr., Rolph Anderson, Ronald T. Tatham, and William Black (1998), *Multivariate Data Analysis*, 5th ed., Upper Saddle River, NJ: Prentice-Hall.

Heckler, Susan E., Terry L. Childers, and Michael J. Houston (1993), "On the Construct Validity of the SOP Scale," *Journal of Mental Imagery*, 17 (3–4), 119–132.

Higgins, E. Tory (1996), "Knowledge Activation: Accessibility, Applicability, and Salience," in *Social Psychology: Handbook of Basic Principles,* ed. E. Tory Higgins and A. W. Kruglanski, 133–168, New York: Guilford.

Higgins, E. Tory and C. Miguel Brendl (1995), "Accessibility and Applicability: Some 'Activation Rules' Influencing Judgments," *Journal of Experimental Social Psychology*, 31 (3), 218–243.

Higgins, E. Tory, Gillian A. King, and Gregory H. Mavin (1982), "Individual Construct Accessibility and Subjective Impressions and Recall," *Journal of Personality and Social Psychology*, 43 (1), 35–47.

Holbrook, Morris B. and Elizabeth C. Hirschman (1982), "The Experiential Aspects of Consumption: Consumer Fantasies, Feelings, and Fun," *Journal of Consumer Research*, 9 (2), 132–140.

Hornik, Jacob (1992), "Tactile Stimulation and Consumer Response," *Journal of Consumer Research*, 19 (3), 449–458.

Hull, Jay, Daniel Lehn, and Judith Tedlie (1991), "A General Approach to Testing Multifaceted Personality Constructs," *Journal of Personality and Social Psychology*, 61 (6), 932–945.

Jarvis, W. Blair G. and Richard Petty (1996), "The Need to Evaluate," *Journal of Personality and Social Psychology*, 70 (1), 172–194.

Johansson, Roland S. (1978), "Tactile Sensibility in the Human Hand: Receptive Field Characteristics of Mechanoreceptive Units in the Glabrous Skin Area," *Journal of Physiology*, 281 (2), 101–123.

Jöreskog, Karl G. and Dan Sörbom (1993), *LISREL 8: Structural Equation Modeling with the SIMPLIS Command Language*, Chicago: Scientific Software International.

Kirmani, Amna and Akshay Rao (2000), "No Pain, No Gain: A Critical Review of the Literature on Signaling Unobservable Quality," *Journal of Marketing*, 64 (2), 1–27.

Klatzky, Roberta L. and Susan J. Lederman (1992), "Stages of Manual Exploration in Haptic Object Identification," *Perception & Psychophysics*, 52 (6), 661–670.

——— (1993), "Toward a Computational Model of Constraint-Driven Exploration and Haptic Object Identification," *Perception*, 22 (5), 597–621.

Klatzky, Roberta L., Susan J. Lederman, and Dana E. Matula (1993), "Haptic Exploration in the Presence of Vision," *Journal of Experimental Psychology: Human Perception and Performance*, 19 (4), 726–743.

Lederman, Susan J. and Roberta L. Klatzky (1987), "Hand Movements: A Window into Haptic Object Recognition," *Cognitive Psychology*, 19 (3), 342–368.

Lingle, John H. and Thomas M. Ostrom (1979), "Retrieval Selectivity in Memory-Based Impression Judgments," *Journal of Personality and Social Psychology*, 37 (2), 180–194.

McClelland, David, Richard Koestner, and Joel Weinberger (1989), *Psychological Review*, 96 (4), 690–702.

Mick, David Glen (1996), "Are Studies of Dark Side Variables Confounded by Socially Desirable Responding? The Case of Materialism," *Journal of Consumer Research*, 23 (2), 106–119.

Moneyline (2000), recording of January 19 CNN broadcast, Integrated Media Systems Center Engineering Research Center, University of Southern California, Los Angeles, videocassette.

Netemeyer, Richard, Scot Burton, and Donald Lichtenstein (1995), "Trait Aspect of Vanity: Measurement and Relevance to Consumer Behavior," *Journal of Consumer Behavior*, 21 (4), 612–626.

Peck, Joann and Terry L. Childers (2003), "To Have and To Hold: The Influence of Haptic Information on Product Judgments," *Journal of Marketing*, April 67 (2), 35–48.

Peterson, Robert A., Sridhar Balasubramanian, and Bart J. Bronnenberg (1997), "Exploring the Implications of the Internet for Consumer Marketing," *Journal of the Academy of Marketing Science*, 25 (4), 329–346.

Richins, Marsha and Scott Dawson (1992), "A Consumer Values Orientation for Materialism and Its Measurement: Scale Development and Validation," *Journal of Consumer Research*, 19 (3), 303–316.

Rook, Dennis W. and Robert J. Fisher (1995), "Normative Influences on Impulsive Buying Behavior," *Journal of Consumer Research*, 22 (3), 305–313.

Rubenstein, Herbert, Spafford Lewis, and Mollie Rubenstein (1971), "Evidence for Phonemic Recoding in Visual Word Recognition," *Journal of Verbal Learning and Verbal Behavior*, 10 (6), 645–657.

Schiff, William and Rivka Oldak (1990), "Accuracy of Judging Time to Arrival: Effects of Modality, Trajectory, and Gender," *Journal of Experimental Psychology: Human Perception and Performance*, 16 (2), 303–316.

Sherry, John F., Jr. (1990), "A Sociocultural Analysis of a Midwestern Flea Market," *Journal of Consumer Research*, 17 (1), 13–30.

Sherry, John F., Jr., Mary Ann McGrath, and Sidney L. Levy (1993), "The Dark Side of the Gift," *Journal of Business Research*, 28 (3), 225–244.

Siegel, Rudolph E. (1970), *Galen on Sense Perception*, Basel: Karger.

Smith, Robert E. and William R. Swinyard (1983), "Attitude-Behavior Consistency: The Impact of Product Trial versus Advertising," *Journal of Marketing Research*, 20 (3), 257–267.

——— (1988), "Cognitive Response to Advertising and Trial: Belief Strength, Belief Confidence and Product Curiosity," *Journal of Advertising*, 17 (3), 3–14.

Spreen, Otfried and Esther Strauss (1991), "Tactile, Tactile and Visual, and Tactile-Motor Tests," *A Compendium of Neuropsychological Tests: Administration, Norms, and Commentary*, New York: Oxford University Press, 334–385.

Tian, Kelly, William O. Bearden, and Gary L. Hunter (2001), "Consumers' Need for Uniqueness: Scale Development and Validation," *Journal of Consumer Research*, 28 (1), 50–66.

Welch, Robert B. and David H. Warren (1980), "Immediate Perceptual Response to Intersensory Discrepancy, " *Psychological Bulletin*, 88 (3), 638–667.

Whitfield, Kermit (2002), "Touch and Go," *Automotive Design & Production*, 114 (6), 36–38.

Wright, Alice A. and John G. Lynch, Jr. (1995), "Communication Effects of Advertising versus Direct Experience When Both Search and Experience Attributes Are Present," *Journal of Consumer Research*, 21 (4), 708–718.