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**The “Right” Consumers for Better Concepts: Identifying and Using  
Consumers High in Emergent Nature to Further Develop New Product Concepts**

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## **The “Right” Consumers for Better Concepts: Identifying and Using Consumers High in Emergent Nature to Further Develop New Product Concepts**

### **ABSTRACT**

While much research has emphasized improving current new product concept techniques, little work has focused on trait-based approaches that specify *which* consumers are the “right” ones to use in the new product development process, particularly in the consumer goods industry. The authors propose that the right consumers to use for new product concept development possess what they call an “emergent nature,” defined as the unique capability to imagine or envision how concepts might be developed so that they will be successful in the mainstream marketplace. The authors draw on research on personality theory and information processing styles to support our conceptualization and develop and validate a highly reliable scale to measure emergent nature (study 1). In subsequent multi-part studies they show in both group (studies 2a-2c) and individual settings (studies 3a and 3b) across the two distinct product categories of home delivery and oral care that consumers high in emergent nature are able to develop product concepts that mainstream consumers will find significantly more appealing and useful compared to concepts developed by typical, lead user or even innovative consumers.

**KEYWORDS:** concept development, new products, information processing, personality traits, lead users, dispositional innovativeness

Consumer firms are generally interested in learning which consumers might be the "right" ones in developing new product concepts so they can improve their chances of success in the marketplace. Which consumers are the most appropriate to engage in the concept development process is important for new product success because while new product development is a major activity of firms (Chandy and Tellis 1998), the failure rates are still high. In general, between 40%-45% of new products fail (Griffin 1997), and the failure rate for consumer packaged goods is even higher – around 49% (Barczak, Griffin, and Kahn 2009).

While much research has emphasized improving current new product concept techniques, for example, via mental analogies (Dahl and Moreau 2002), visual depiction and animation (Dahan and Srinivasan 2000), Web based testing (Dahan and Hauser 2002), or conjoint analysis (Green, Krieger, and Vavra 1997), little work has focused on trait-based approaches that specify *which* consumers may be most helpful in developing product concepts, particularly in the consumer goods industry.

The lead user approach has received wide attention in business-to-business settings. Lead users have a conscious awareness of their domain-specific needs, are motivated to innovate to satisfy those needs, and experience those needs earlier than most in the market (Lilien, et.al. 2002; Morrison, Roberts, and von Hippel 2000). The limited number of lead user studies in consumer settings (see, for example, Schreier, Oberhauser, and Prügl 2007) suggests that it may be hard to identify lead users in consumer markets and lead user status may not be a trait-based characteristic, but instead specific to domains of use.

A notable consumer behavior trait-based approach that evaluates the potential success of an innovation uses consumer innovativeness, defined as an underlying predisposition of

consumers to *buy* new and different products (Midgley and Dowling 1978). The consumer innovativeness construct is distinct from innovation adopter categories (Rogers 2003), which are determined ex-post product introduction (Steenkamp, ter Hofstede, and Wedel 1999). Consumer innovativeness has been found to correlate positively with personality traits such as extraversion, risk taking, and impulse buying (Steenkamp et al. 1999).

### *Emergent Nature*

We propose that the right consumers to use when developing new product concepts possess what we call an “emergent nature,” defined as the unique capability to imagine or envision how concepts might be further developed so that they will be successful in the mainstream marketplace. We theorize that this envisioning arises due to a unique constellation of personality traits and processing abilities that enables such consumers to engage in a synergistic process of visualization and rationalization to improve product concepts. The unique constellation of personality traits and processing abilities that we conceptualize are important for further developing successful product concepts include openness to new experiences and ideas, an intellectual self-focus referred to as reflection, the ability to synergistically apply both an experiential *and* rational processing style, the ability to process information both verbally (rational style) and visually (experiential style), high levels of creativity, and optimism. Below we briefly review the rationale underlying our predictions.

Previous research has found that openness to experience is related to divergent thinking, an important component of creativity (McCrae 1987). Individuals high on this trait are more imaginative and reflective, and enjoy experiences with unique aesthetic, emotional and

intellectual components. An open-minded thinking disposition (Stanovich and West 1997) is expected to correlate strongly with emergent nature because individuals with such dispositional tendencies will exhibit openness to new experiences and ideas and apply logical reasoning.

Reflection is a type of private introspection (Fenigstein, Scheier and Buss 1975) stimulated by exploratory curiosity and represents an intellectual self-consciousness or self-focus motivated by epistemic goals (Trapnell and Campbell 1999). We hypothesize that consumers high in emergent nature possess greater amounts of internal reflection, thus contributing to an increase in network associations in memory that could extend beyond the self to other associations. Such consumers are able to experientially explore *and* rationally investigate unique alternatives in product development contexts.

Along these same lines of reasoning, several types of information processing are expected to be positively correlated with emergent nature. Extensive research in information processing supports the relative tendency of individuals to engage in a rational (analytic, logical, causal, and, systematic) versus experiential (intuitive, affective, and holistic) processing or thinking style (e.g Epstein, Pacini, Denes-Raj, and Heier 1996; Pacini and Epstein 1996; Sloman 1996; Smith and DeCoster 2000). Recently, Novak and Hoffman (2009) referred to “synergistic effects” in which *both* experiential and rational task-specific thinking style might correlate positively with performance and function in a more complementary fashion. We expect consumers high in emergent nature to possess the ability to process information both experientially and rationally. We argue that the active, logical processing associated with a rational thinking style permits consumers to make optimal judgments about the utility of a particular product concept, while the experiential thinking style involves emotional and

associative processing that we hypothesize yields a more intuitive understanding of the concept's usefulness. This suggests these information processing styles may operate synergistically and will be positively correlated with emergent nature.

Relatedly, we also expect consumers high in emergent nature to possess the ability to process information *both* verbally (rational style) and imaginally (experiential style). Verbal processing refers to an individual's ability to process words and imaginal processing relates to an individual's ability to visually process imagery (Childers, Houston and Heckler 1985). The ability to process words and imagery seems highly relevant to a product concept envisioning task incorporating visualization and rationalization.

Emergent nature is also predicted to be positively correlated with creativity and optimism. Creativity can be conceptualized in a variety of ways, but can be difficult to measure. Our conceptualization relies on self-reports that tap an individual's self-concept of creativity and "creative personality" (Gough 1979). Optimism relates to the extent people view things to be better in the future than they are now (Kopalle and Lehmann 2001). Consumers who are able to envision how current new product concepts might be better developed for future success suggests an intrinsically optimistic outlook.

Our conceptualization is related to the notion of so-called industrial technical visionaries (Vojak, Griffin, Price, and Perlov 2006) who are able to "effectively synthesize multiple technologies and business strategy to identify new...products," along with preliminary research from organizational neuropsychology suggesting that visionaries display higher levels of brain activity than non-visionaries in areas of the brain associated with visual processing and

information organization (Dvorak and Badal 2007; Peterson, Balthazard, Waldman and Thatcher 2008).

We use our conceptualization to develop and validate a highly reliable scale that can be used to identify consumers high in emergent nature. Once such consumers have been identified, we then test the predictive validity of the idea that consumers high in emergent nature are better able to further develop product concepts compared to other consumers. We predict that emergent nature is unidimensional and distinct from both lead user status (itself an original scale we develop based on Morrison, Roberts and von Hippel (2000) and predict to be a unidimensional construct) and dispositional innovativeness (Steenkamp and Gielens 2003) and also predict that it will be positively correlated with, but distinct from openness to new experiences, reflection, verbal and visual processing styles, experiential and rational thinking styles, creativity and optimism (study 1). We then use our highly reliable and valid instruments to measure emergent nature and lead user status, along with an existing scale to measure dispositional innovativeness, in several multi-part studies in consumer settings to establish the predictive validity of the emergent nature construct. We predict that consumers high in emergent nature are able to improve product concepts that mainstream consumers will find significantly more appealing and useful compared to concepts that are developed by typical, lead user or even innovative consumers in both group (Studies 2a-2c) and individual settings (Studies 3a and 3b) across the two distinct product categories of home delivery and oral care.

## *STUDY 1: SCALE DEVELOPMENT AND VALIDATION*

### *Calibration Method*

A total of 1124 native English speaking adult respondents randomly selected from a global online panel comprised the total analysis sample. Sampling details are provided in the section “Study 1 Sampling Details” in the Web Appendix. Following Wickens (1989), we unevenly split the sample into a larger calibration sample of 754 randomly drawn respondents to develop the emergent nature scale; 370 respondents served as the validation sample.

Respondents completed an online study they were told had two separate and independent parts in the same experimental session. Respondents were told the “first” study would assess their general attitudes toward products and services. All respondents first answered a short series of questions regarding Internet usage. Following Churchill (1979), we used our theoretical definition of emergent nature to generate an extensive set of preliminary items as the first step in scale construction. Through item analysis in a pre-test we refined the set to 17 items.

Respondents were presented with a battery of scales including the seventeen items comprising our original emergent nature scale, an existing eight-item scale measuring a consumer’s tendency toward dispositional innovativeness (Steenkamp and Gielens 2003), Rook and Fisher’s (1995) nine-item scale of impulse buying, and eight items comprising our original lead user status scale, specific to the domain of consumer home delivery via an intelligent storage device outside of people’s homes called “SmartBox” (See Appendix A for the description used). Respondents evaluated their general attitude toward the SmartBox, completed single-item measures regarding adoption, use, and ordering behavior, estimated the maximum price they would be willing to pay for installation of the SmartBox, how attractive they believed the SmartBox currently is to average consumers, whether they could picture the SmartBox being developed in the future in such a way that average consumers would find it attractive, and to provide up to twenty ways

they “can think of for changing the SmartBox so that it will be successful in the marketplace as a home delivery solution for average consumers.” Respondents also evaluated their interest and experience with the home delivery of goods and services using scales for product class involvement and knowledge (Beatty and Talpade 1994) and a single item measure for actual use.

In the “second” study, respondents completed a series of validation scales designed to measure the personality traits and information processing styles hypothesized to correspond to our conceptualization of emergent nature, including openness to experience, reflection, verbal and visual processing, rational and experiential thinking style, optimism, creativity, and impulse buying behavior. We used the twelve-item “openness to experience” subscale from the Revised NEO Personality Inventory (Costa and McCrae 1992), Trapnell and Campbell’s (1999) twelve-item reflection scale, two eleven-item scales that tapped verbal and visual processing style (Childers, Houston and Heckler 1985), the 24-item short form of the Rational-Experiential Inventory (Norris and Epstein 2003) to measure rational and experiential processing, two reliable and valid self-report measures of creativity, one comprising three original items developed in pre-tests (“I consider myself to be a creative person,” “Creative endeavors are important to me in my life,” and “My best friends consider me to be a creative person”) and the other a widely used self-assessment checklist to assess “creative personality” based on an individual’s self concept derived from the Adjective Check List (Gough 1979), and one three-item consumer optimism scale (Kopalle and Lehmann 2001).

### *Scale Development Results*

We followed current practice in psychometrics (e.g. see Kline 2000) to construct the scales (see the section “Study 1 Scale Construction” in the Web Appendix). Reduced from the original 17 items, the final eight item emergent nature scale ( $\alpha=.929$ ), accounted for 63% of the variation in the correlations and displayed one dominant factor, supporting the hypothesis that a consumer’s emergent nature is a unidimensional construct that can be reliably measured. An exploratory principal axis factor analysis and iterative item analysis of the domain-specific lead user status (hereafter “lead user”) scale items produced a five-item scale ( $\alpha=.931$ ) accounting for 73% of the variation in the correlations and one dominant factor, supporting the hypothesis that our domain-specific lead user scale is unidimensional. The final sets of items for both scales are listed in table 1. Steenkamp and Gielen’s (2003) eight-item dispositional innovativeness scale was used as is ( $\alpha=.830$ ).

[Insert Table 1 About Here]

Moderately low correlations among the observed summed scales supported our theory that emergent nature is a construct distinct from dispositional innovativeness ( $r=.37$ ) and lead user status ( $r=.39$ ). Also consistent with theory, lead user status and dispositional innovativeness exhibited a weak correlation ( $r=.18$ ) in the calibration sample. We used confirmatory factor analysis to formally test discriminant validity of the three constructs. The fit of a single-factor structural model to the three scales was very poor ( $CFI=.599$ ,  $RMSEA=.171$ ), but a three-factor structural model fit well ( $CFI=.941$ ,  $RMSEA=.066$ ), supporting our hypothesis that emergent nature, dispositional innovativeness and domain-specific lead user status are three distinct constructs. All factor loadings were above .60 except for three items on the dispositional innovativeness scale.

### *Scale Validation*

In the validation sample, coefficient alphas were also high (emergent nature  $\alpha=.937$ ; dispositional innovativeness  $\alpha=.801$ ; lead user  $\alpha=.930$ ) and correlations among the summed scales followed the same pattern as in the calibration sample: emergent nature exhibited low to moderate correlations with dispositional innovativeness ( $r=.38$ ) and lead user status ( $r=.48$ ) and lead user status and dispositional innovativeness were only weakly associated ( $r=.17$ ). The fit of the confirmatory factor analysis three-factor structure was also very good (CFI=.938, RMSEA=.069), with all factor loadings were above .60 except for three items on the dispositional innovativeness scale, again supporting our theory that emergent nature, dispositional innovativeness and domain-specific lead user status are three distinct constructs.

Having established reliability and discriminant validity with the calibration and validation samples, we combined the samples to demonstrate construct validity. Means of the summed scales and measured variables, along with correlations with demographics appear in the Web Appendix (see the section “Study 1: Construct Validity”).

Table 2 presents the correlations and regression coefficients from fitting a series of simple regression models using emergent nature, lead user status and dispositional innovativeness as predictors and the personality traits and information processing scales as the dependent variables. Note that the regression coefficients in each model are attenuated compared to the correlation coefficients because they include the other constructs in the model. Thus, each regression model tells us whether emergent nature adds predictive value over and above lead user status and dispositional innovativeness and which construct is most important in accounting

for variation in the dependent variable. Overall, the results show clearly that emergent nature is a useful construct that adds predictive value over and above dispositional innovativeness and lead user status. It correlates with and is significant with more personality traits and information processing scales than the other two predictors. As predicted, it is significantly positively associated with reflection, openness to experience, verbal and visual processing, experiential and rational thinking style, creativity, and optimism. In fact, the only regression model in which emergent nature does not add anything over and above the other constructs is impulse buying. This seems reasonable considering that impulse buying behavior is an unplanned purchase defined by an immediate urge to buy a product, counter to behavior expected given the rational component posited in emergent nature. In contrast, dispositional innovativeness does not add additional predictive value over and above emergent nature, except for experiential thinking style and impulse buying. Compared to emergent nature, dispositional innovativeness has a higher association with experiential thinking style and impulse buying and a lower association with rational thinking style, reflection, openness, verbal and visual processing, creativity and optimism. Lead user status does not add predictive value beyond emergent nature for any of the validation scales.

[Insert Table 2 About Here]

In table 3, we present a similar analysis using the SmartBox scales as the dependent variables. In general, emergent nature and dispositional innovativeness tend to be more strongly associated with attitude and intention measures than lead user status, possibly because lead user status is domain-specific, not SmartBox specific. However, lead user status adds predictive value over and above emergent nature and dispositional innovativeness for being attractive in its

current form, category involvement, knowledge and actual use. Note that emergent nature adds predictive value beyond dispositional innovativeness and lead user status for picturing how it can be developed in the future and the number of ways the SmartBox can be improved, supporting our conceptualization.

[Insert Table 3 About Here]

An additional main effects analysis, tabled in the Web Appendix (see table W4 in the section “Study 1: Construct Validity”), showed that consumers high in emergent nature exhibit significantly higher levels of openness to new experience, reflection, visual processing, experiential and rational processing, and creativity, compared to consumers high on dispositional innovativeness or lead user status, with the exception that consumers high on lead user status and dispositional innovativeness were significantly higher on impulse buying behavior than consumers high on emergent nature.

Emergent nature correlates with creativity (self-perceived  $r=.462$  and creative personality  $r=.360$ ), experiential thinking style ( $r=.166$ ) and rational thinking style ( $r=.389$ ). Formal tests using confirmatory factor analysis allow us to test the hypothesis that emergent nature, creativity, and experiential and rational thinking styles are distinct constructs. The fit of a single factor model to the scales for emergent nature, creative personality, self-perceived creativity, and experiential and rational thinking styles was very poor (CFI=.513, RMSEA=.10), but a five-factor confirmatory model fit well (CFI=.900, RMSEA=.044), with all factor loadings above .60 (except for the 30 items on the creative personality checklist which had 14 items below .45). In addition, the fit of a single factor confirmatory model to the scales for emergent nature, self-perceived creativity, and rational and experiential thinking styles was very poor (CFI=.631,

RMSEA=.206), but a four factor confirmatory factor analysis model fit well (CFI=.965, RMSEA=.066), with all factor loadings above .60. This lends further support to the discriminant validity of emergent nature.

Having established reliability, construct and discriminant validity, we examine predictive validity in several concept development domains to extend generalizability.

## *STUDY 2: GROUP CONCEPT DEVELOPMENT AND MARKET TESTING*

### *Study 2a: Concept Development*

Four mutually exclusive groups were created by classifying the study 1 respondents based on their median scores on each of the three construct scales. The high emergent nature group contained respondents above the median on emergent nature and below the median on dispositional innovativeness and lead user status. The high lead user and high innovativeness group were similarly constructed so that each group had members above the median on that group's construct and below the median on the others. The fourth group consisted of respondents who scored at the median on all three scales and served as the control group<sup>1</sup>. 50 respondents were randomly selected from each group and email invited to participate in a follow-up five day total online bulletin board group study. A total of 24 respondents completed the study. See the Web Appendix ("Study 2a Sampling Details") for selection and implementation details. Participants in each group were instructed to "further develop the SmartBox concept so that it will be successful in the marketplace as a home delivery solution for average consumers." At the end of the three day development period, each group had produced a single SmartBox concept

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<sup>1</sup> The remaining respondents were not relevant for the purposes of the study and were not utilized further.

(listed in Appendix B), that they believed would be the most appealing to the typical consumer when introduced into the market. Participants then rated their trust with the other participants in the group (four-item scale adapted from Ramsey and Sohi 1997), satisfaction with the experience (11-item scale adapted from Mano and Oliver 1993), satisfaction with the final SmartBox concept (four-item scale adapted from Ganesan 1994), attitude toward the concept, new product novelty (seven-item scale adapted from Moorman 1995), post-task mood (Allen and Janiszewski 1989) and involvement (Swinyard 1993), all measured on seven-point scales. Mean scores on the measures for the four groups were not noticeably different and it was clear that the online bulletin board concept development task was successful; the average (across group) scores for trust (M=6.37), satisfaction with the experience (M=6.49), satisfaction with the concept (M=6.15), attitude toward the concept (M=6.19), new product novelty (M=1.89 with lower scores indicating more novel product concepts), post-task mood (M=6.46) and involvement with the task (M=6.12) were uniformly high. Next, these final product concepts were used to test market reaction with a large group of real-world consumers.

#### *Study 2b: Testing Market Reaction*

631 native English-speaking adult consumers randomly selected from a global online panel evaluated the four concepts from study 2a. Sampling details are provided in the Web Appendix (“Study 2b Sampling Details”). Participants were presented with the diagram and basic description of the SmartBox (see Appendix A) and then reviewed the four different SmartBox concepts (see Appendix B), identified only by number (one through four), counterbalanced to control for order effects. Participants then indicated which concept was the

most and least appealing, rated their attitudes toward each concept on four standard concept testing scales (bad/good, dislike/like, dull/dynamic and not useful/useful), their involvement with and knowledge of home delivery (adapted from Beatty and Talpade 1994), and their frequency of home delivery.

*Results.* On average, participants reported moderate levels of involvement with the general idea of home delivery (4.5 on a 7-point scale) and knowledge with the practice (3.94 on a 7-point scale). Only one-third of the respondents reported having goods delivered to their home once a week or more; 12.5% said they had only rarely or never had goods delivered at home. As a group, our concept testing sample was neither particularly knowledgeable/experienced nor inexperienced/not knowledgeable regarding home delivery.

We standardized and summed the six items (most appealing, least appealing, bad/good, dislike/like, dull/dynamic, not useful/useful) to create a composite score for each respondent and used those composite scores to construct scales for each of the four concepts. Coefficient alphas were uniformly high (control  $\alpha=.853$ , high lead user  $\alpha=.839$ , high innovativeness  $\alpha=.80$ , and high emergent nature  $\alpha=.848$ ). A repeated measures ANOVA revealed a significant main effect ( $F=92.73, p = .000$ ) on the concept testing scale, with the high emergent concept ( $M=1.77$ ) the highest rated concept compared to the high lead user ( $M=1.19$ ), high innovativeness ( $M=-0.61$ ), and control group ( $M=-1.27$ ) concepts.

Since we have multiple observations from each respondent, we accounted for respondent-specific effects by fitting a random effects regression model (Raudenbush and Bryk 2002, p. 23), where the composite score of each respondent on each concept served as the dependent variable and the independent variables were three dummy variables representing the four concepts. The left out dummy variable was the concept developed by the high emergent nature group. See the Web Appendix (“Study 2b Model Details”) for model specification. Model significance is tested

by comparing the full model to a null model that includes the intercept and respondent-specific effects.

Results reveal that the full model performs significantly better than the corresponding null model ( $N=2524$ ,  $-2LL=14358.9$ ,  $AIC=14362.9$ ,  $\chi^2=255.4$ ,  $p < .001$ ). The SmartBox concept developed by the high emergent group was rated significantly higher than the lead user (by .58 units,  $p < .01$ ), innovativeness (by 2.37 units,  $p < .001$ ) and control (by 3.04 units,  $p < .0001$ ) concepts. Note that we can also account for respondent level effects through OLS regressions with three dummy variables representing the four product concepts and either 630 dummies for the 631 participants or the mean response for each respondent across the four concepts as another independent variable. In both analyses, results similar to those reported above were obtained.

#### *Study 2c: Concept Evaluation*

To further understand consumer preference for the emergent nature and lead user concepts, two independent samples of native English-speaking adult consumers randomly selected from a global online panel evaluated the high emergent nature concept ( $N=97$ ) and the lead user concept ( $N=95$ ). Sampling details are provided in the Web Appendix (“Study 2c Sampling Details”). In each sample, consumers evaluated the concept on fifteen attributes derived from a convenience sample of 25 MBA students who read the basic SmartBox concept description and generated a list of potential product attributes that would be relevant for such a product. Conceptually, this approach is consistent with practice in large consumer goods companies when using a battery of questions in new product testing.

The high emergent nature concept was rated significantly higher than the high lead user concept on 11 attributes ( $p < .01$ ,  $p < .05$ , and  $p < .1$  on 4, 9, and 11 attributes respectively). There were no significant differences on the remaining four attributes. A two-factor solution from a factor analysis of the attribute ratings explained 73.4% of the variation. (We obtained

similar factor structures when we factor analyzed the ratings for each concept separately.) The two dimensions can generally be interpreted as “utilitarian” (easy to use, secure, prevents breakage, keeps cold foods cold, can use anytime, is waterproof, sturdy, convenient, has a unique design, safe to use) and “hedonic” (fun to use, looks good, saves money, saves time, easy to install). A regression analysis of the factor scores showed that the high emergent nature concept was rated significantly higher than the high lead user concept ( $p < .05$ ) on both factors, indicating that the high emergent nature concept provided more utilitarian and hedonic benefits compared to the high lead user concept. Figure 1 plots the attribute means for the two concepts, with the utilitarian attributes shown in bold text.

[Insert Figure 1 About Here]

### *STUDY 3: INDIVIDUAL CONCEPT DEVELOPMENT AND MARKET TESTING*

Studies 2a-2c demonstrated in a group setting that individuals high in emergent nature together produced a home delivery concept that was subsequently rated significantly higher than concepts produced by groups of individuals high in lead user status or innovativeness or average on all three constructs. Since the groups’ concepts were not standardized for length or style, we cannot rule out a confound with presentation. In studies 3a and 3b, our objective was to simulate the concept development and market testing process at the individual level, in another category (a frequently purchased consumer packaged good), while controlling for concept presentation effects, as well as individual differences in lead-user status, emergent nature, innovativeness, involvement and expertise.

### *Study 3a: Individual Concept Development*

A large consumer packaged goods firm provided the authors with a basic description of a new product idea in the oral care category that could benefit from further concept development before market testing. 185 adult native English speaking consumers purchased from a commercial research panel further developed a concept for “Orion” dental spray by completing a “fill in the blanks” task using a concept development template. The template (see Appendix C) was constructed for the purposes of this study by a professional concept development expert blind to the study hypotheses with significant experience working for large retail clients. Respondents were instructed to further develop the basic idea for the dental spray concept so that typical consumers would find it as appealing as possible and want to buy it. Following the concept development task, we measured respondents’ emergent nature, lead user status, and dispositional innovativeness, along with category involvement and expertise.

We used a defined procedure to systematically combine and standardize the 185 individually developed dental spray concepts into four separate concept descriptions for the high emergent nature, high lead user status, high dispositional innovativeness and control groups. Each respondent was categorized into one of the four mutually exclusive groups based on their median scores on emergent nature, dispositional innovativeness and lead-user scales. The high emergent nature group (N=16) contained respondents above the median on emergent nature and below the median on dispositional innovativeness and lead user status, the high lead user group (N=13) contained those above the median on lead user status and below the median on high emergent nature and innovativeness and the high innovativeness group (N=21) contained those above the median on innovativeness and below the median on the other two. The control group

(N=54) consisted of respondents who scored at the median on all three scales. The remaining 81 respondents were not included in subsequent analyses.

The concept description templates for 12 respondents<sup>2</sup> from each group were randomly selected for further analysis and independently evaluated by a research assistant blind to the study's hypotheses and group identification. The researcher recorded the benefits identified in each respondent's template, summarizing the unique benefits mentioned by each group as well as benefits mentioned in common across all groups. Using a concept writing template developed by the professional expert that specified how to integrate benefits to arrive at an overall concept description, the research assistant wrote dental spray concept descriptions for each group based on the unique benefits mentioned by that group. The common benefits mentioned across groups (quick, convenient and on the go) were used to update the basic description of the dental spray. The professional expert and the research assistant, still blind to the study's hypotheses and group identities, separately reviewed each group concept description against the list of benefits and templates to ensure that the descriptions accurately captured the unique benefits identified by each group. The basic description was similarly reviewed to ensure that it captured the common benefits mentioned across all groups. The procedure produced four concept descriptions

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<sup>2</sup>Recent research (Dahl and Moreau 2007) finds that 12 respondents produces "data saturation," uncovering 97% of the themes and 92% of the total number of codes used in qualitative transcripts (Guest, Bunce and Johnson 2006). Similarly, a widely applied model developed in usability engineering research (Nielsen and Landauer 1993) shows that twelve users are highly diagnostic for testing, uncovering 90% of the usability problems in a design.

equivalent with respect to length and style but unique with respect to benefits identified. The final Orion dental spray concepts appear in Appendix D.

### *Study 3b: Concept Testing*

An independent sample of 207 adult native English speaking consumers purchased from a commercial research panel evaluated the four concepts in a within-group study. The concepts were counterbalanced to control for order effects. Respondents were instructed to carefully review the four different concepts, identified only by number, and then indicate which concept was most and least appealing, rated their attitudes toward each concept on four standard concept testing scales (bad/good, dislike/like, dull/dynamic and not useful/useful), along with their involvement with and knowledge of oral care and their frequency of oral care. Also collected for each concept were purchase intention and purchase frequency likelihood, three standard concept testing items (different, believable, solves a problem) adapted from Dolan (1993) and five items adapted from Rogers (2003) innovation dimensions of relative advantage, compatibility, complexity, observability, and trialability. We also measured respondents' emergent nature, domain specific lead user status, and dispositional innovativeness.

*Results.* Participants reported moderate levels of involvement with and knowledge of oral care (4.3 and 3.8 respectively on a 7-point scale); almost all participants (but not all!) reported using toothpaste at least once a day. As in study 2b, we standardized and summed the original six-item concept testing scale to create a composite score for each respondent and used those to construct scales for each of the four concepts. Coefficient alphas were again uniformly high (control  $\alpha=.822$ , high lead user  $\alpha=.878$ , high innovativeness  $\alpha=.844$ , and high emergent

nature  $\alpha=.864$ ). A repeated measures ANOVA revealed a significant main effect ( $F=19.081$ ,  $p = .000$ ) on the concept testing scale, with the high emergent concept ( $M=1.80$ ) the highest rated concept compared to the high lead user ( $M=0.26$ ), high innovativeness ( $M=-0.43$ ), and control ( $M=-1.11$ ) concepts. In addition, as figure 2 shows, the concept developed by high emergent nature individuals was consistently rated higher compared to the concepts developed by high lead users, individuals high in dispositional innovativeness or individuals in the control group on all three concept testing scales and all five innovation scales, particularly purchase likelihood.

[Insert Figure 2 About Here]

We fit a random effects regression analysis to account for respondent-specific effects using the composite score of each respondent for each concept as the dependent variable. The independent variables were three dummy variables representing the four concepts. The left out dummy variable was the concept developed by the individuals high in emergent nature. To control for observed heterogeneity (the random effects regression model we fit accounts for unobserved heterogeneity), we also included covariates to control for lead user status, emergent nature, dispositional innovativeness, involvement, knowledge with oral care, gender and age. See the Web Appendix (“Study 3b Model Details”) for model specification. Results show that the full model performs significantly better than the corresponding null model that includes the intercept and respondent-specific effects ( $N=828$ ,  $-2LL=4808$ ,  $AIC=4812.0$ ,  $\chi^2=53.9$ ,  $p < .001$ ). As predicted, the oral care concept developed by individuals high in emergent nature was rated significantly higher than the lead user (by 2.06 units,  $p < .001$ ), innovativeness (by 2.23 units,  $p < .001$ ) and control (by 2.90 units,  $p < .001$ ) concepts. Only the covariate for emergent nature was significant ( $p < .05$ ); consumers high on emergent nature were more likely to rate the oral

care concepts more highly, compared to other individuals. We obtain similar model results treating all three concept testing scales and all five innovation scales as dependant variables: the emergent nature concept was significantly better than the other concepts on all measures.

### *GENERAL DISCUSSION*

In this paper we argued that consumers with an “emergent nature,” the unique capability to envision how new product concepts might be developed, could be identified and used in business-to-consumer markets to further improve new product concepts so that they will be successful in the marketplace. To test our predictions, we developed in study 1 a highly reliable and valid scale, based on psychological theories of human information processing and trait-based personality, to measure the emergent nature construct. This study distinguished the emergent nature construct from domain-specific lead user status and the dispositional innovativeness trait, as well as related personality traits and information processing styles like openness to new experiences, reflection, verbal and visual processing styles, experiential and rational thinking styles, creativity and optimism.

In two multi-part studies in group and individual concept development contexts in the distinct categories of home delivery (study 2) and oral care (study 3), we used our emergent nature scale to test the prediction that product concepts further developed by the “right” consumers, those high on emergent nature, would be found significantly more appealing (and have a higher purchase likelihood) by mainstream consumers compared to concepts developed by lead users, consumers high on dispositional innovativeness and average consumers. The

results supported our predictions and established the predictive validity of the emergent nature construct.

Consumers high in emergent nature may have the tendency to emphasize utilitarian attributes in their improved product concepts, compared to high lead users. As can be seen in figure 1 based on data from study 2c, the attributes have been ordered in terms of mean emergent nature concept ratings from highest (on the left) to lowest (on the right). The attributes clearly form two groups with utilitarian attributes (shown in bold) mainly on the left and hedonic attributes on the right. On average, the gap between the emergent nature and lead user mean ratings is larger for the utilitarian attributes. If we examine the concepts in Appendix D based on results from study 3a, we notice that the emergent nature concept mentions “Approved by the American Dental Association,” and the “patented fluoride mixture.” These utilitarian attributes were not mentioned by any of the individuals in the other conditions.<sup>3</sup> It may be fruitful to explore this observation in future research.

Researchers may also find value in further exploring the lead user construct in consumer contexts as we have also developed a reliable and useful scale to measure lead user status in consumer-specific domains. The concepts developed by high lead users also fared well - though not as well - as concepts development by consumers high on emergent nature. This lends face validity to our results and reinforces research arguing that lead users represent a useful segment for developing new product concepts (von Hippel 1986).

How does emergent nature influence the ability to further develop product concepts? We believe that consumers high in emergent nature, owing to their openness to new experiences,

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<sup>3</sup> We thank two anonymous reviewers for suggesting we explore this insight.

reflection, verbal and visual processing styles, experiential and rational thinking styles, along with creativity and optimism, are able to engage in a process of successful idea generation to enhance the original concept and logical analysis to refine and develop the concept further. We theorize an underlying process in which consumers with a high emergent nature develop an intuitive, almost “instinctive” understanding of a new concept, by, for example, visualizing its latent uses through a sequence of affective and associative perceptions, and also engage in a logical and analytic effort to evaluate and refine the concept. These processes may work together in a complementary and iterative fashion where a rational effort to analyze a product concept may activate further implicit experiential associations about that concept, followed by another round of rational analysis, and so on. The essence of our conceptualization of emergent nature is that consumers so possessed are able to imagine or visualize new product concepts that may best fit typical consumers’ needs and correspondingly inform their experiential impressions and associations with evaluative judgments and vice versa. It may prove to be a particularly fruitful line of future inquiry to explore the synergistic action of these processes.

While our results, based on two product categories and individual and group settings are promising, they are not without limitations. We tested the product concepts using written descriptions rather than physical prototypes, although descriptions are typically used for many concept testing studies where prototypes would be cost prohibitive. Clearly, it would be important to show that actual products based on concepts developed by consumers high in emergent nature are ultimately found more appealing and lead to greater sales, compared to those developed by other types of consumers. This is an exciting area for future research and our paper provides the first step in being able to identify and use emergent consumers in developing new

products. A related limitation is that our studies were performed in laboratory settings. As our main aims were to demonstrate that emergent nature can be reliably and validly measured and that concepts developed by consumers high in emergent nature would appeal most to typical consumers, laboratory settings are appropriate for this first demonstration. Nonetheless, future research should seek to replicate our results in multiple and diverse field settings.

In this paper, our focus was limited to consumers who were exclusively high in emergent nature, lead user status, *or* dispositional innovativeness, (along with control groups of average individuals). While we believe our results support the contention that consumers high in emergent nature are the “right” consumers to use in product concept development, we cannot make the claim that they are “best.” Future research can and should examine which combinations of consumers with these unique capabilities are best for particular product concept development tasks and how these combinations, for example, high only on emergent nature, high on both emergent nature and lead user status or high on both emergent nature and dispositional innovativeness, or high on all three constructs, compare against each other.

From a managerial perspective, our research complements current concept testing methods and could improve their effectiveness since our results suggest that concepts developed by consumers high in emergent nature may have a higher likelihood of ultimate success with mainstream customers. Identifying and employing such consumers in the concept development process may act as an “early warning system” in those cases where products have the potential to be disruptive (Chandy and Tellis 1998). Our results also give direction to firms striving to adopt a positive orientation toward emergent customer segments (Govindarajan and Kopalle 2004), but less clear about how they can identify such customers. Although much work remains to be done,

the idea of identifying and using consumers high on emergent nature in the development of new products seems viable and worthy of the effort required to understanding it more fully.

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**TABLE 1**

**FINAL ITEMS FOR EMERGENT NATURE AND LEAD USER SCALES**

**Emergent Nature**

When I hear about a new product or service idea, it is easy to imagine how it might be developed into an actual product or service.

Even if I don't see an immediate use for a new product or service, I like to think about how I might use it in the future.

When I see a new product or service idea, it is easy to visualize how it might fit into the life of an average person in the future.

If someone gave me a new product or service idea with no clear application, I could "fill in the blanks" so someone else would know what to do with it.

Even if I don't see an immediate use for a new product or service, I like to imagine how people in general might use it in the future.

I like to experiment with new ideas for how to use products and services.

I like to find patterns in complexity.

I can picture how products and services of today could be improved to make them more appealing to the average person.

**Domain-Specific Lead User**

Other people consider me as "leading edge" with respect to home delivery of goods.

I have pioneered some new and different ways for home delivery of goods.

I have suggested to stores and delivery services some new and different ways to deliver goods at home.

I have participated in offers by stores to deliver goods to my home in new and different ways.

I have come up with some new and different solutions to meet my needs for the home delivery of goods.

**TABLE 2: CORRELATIONS AND REGRESSION RESULTS FROM STUDY 1  
VALIDATION MODELS WITH EMERGENT NATURE (E), DISPOSITIONAL  
INNOVATIVENESS (DI), AND DOMAIN-SPECIFIC LEAD USER STATUS (LU) AS  
PREDICTORS AND PERSONALITY TRAITS AND INFORMATION PROCESSING  
SCALES AS DEPENDENT VARIABLES**

	Correlations			Standardized Regression Coefficient (p-value) for the Column Predictor Given the Row Dependent Variable:			Model R <sup>2</sup>
	E	DI	LU	E	DI	LU	
Experiential Processing	.166	.227	-.011 ns	<b>.140</b> (.000)	<b>.196</b> (.000)	<b>-.103</b> (.001)	.069
Rational Processing	.389	.148	.108	<b>.412</b> (.000)	.014 (.631)	<b>-.066</b> (.029)	.155
Reflection	.397	.175	.230	<b>.351</b> (.000)	.038 (.196)	<b>.077</b> (.01)	.164
Openness	.372	.281	.085	<b>.348</b> (.000)	<b>.174</b> (.000)	<b>-.091</b> (.003)	.170
Verbal Processing	.309	.255	.160	<b>.236</b> (.000)	<b>.166</b> (.000)	.033 (.288)	.121
Visual Processing	.326	.168	.092	<b>.327</b> (.000)	<b>.062</b> (.04)	-.055 (.075)	.112
Creativity (self-perceived)	.462	.204	.272	<b>.406</b> (.000)	.045 (.112)	<b>.095</b> (.001)	.222
Creative Personality	.360	.212	.189	<b>.308</b> (.000)	<b>.095</b> (.001)	.044 (.146)	.139
Optimism	.270	.175	.146	<b>.223</b> (.000)	<b>.090</b> (.003)	.037 (.240)	.081
Impulse Buying	.145	.310	.162	-.005 (.890)	<b>.292</b> (.000)	<b>.113</b> (.000)	.108

\*All correlations, except as noted, are significant at the 0.01 level (2-tailed). All regression models are significant at the .000 level.

**Notes:** E = Emergent nature, DI = Dispositional innovativeness, LU = Domain specific lead user

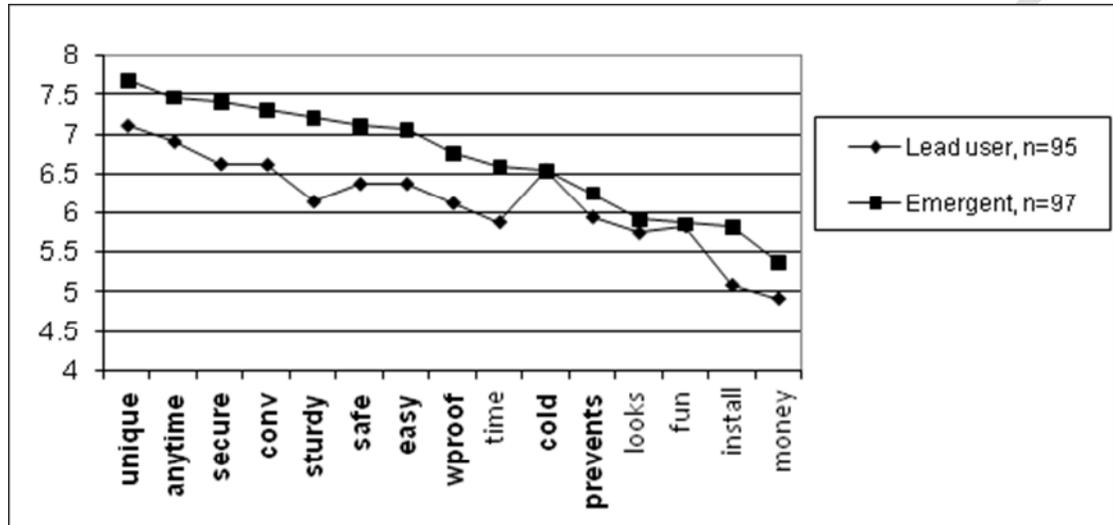
**TABLE 3: CORRELATIONS AND REGRESSION RESULTS FROM STUDY 1 VALIDATION MODELS WITH EMERGENT NATURE (E), DISPOSITIONAL INNOVATIVENESS (DI), AND DOMAIN-SPECIFIC LEAD USER STATUS (LU) AS PREDICTORS AND SMARTBOX SCALES AS DEPENDENT VARIABLES**

	Correlations			Standardized Regression Coefficient (p-value)			Model R <sup>2</sup>
	E	DI	LU	E	DI	LU	
Attitude toward SmartBox	.220	.189	.119	<b>.164</b> (.000)	<b>.126</b> (.000)	.029 (.363)	.063
Adopt if given free	.249	.230	.213	<b>.141</b> (.000)	<b>.158</b> (.000)	<b>.127</b> (.000)	.099
Use if given free	.289	.260	.186	<b>.196</b> (.000)	<b>.178</b> (.000)	<b>.073</b> (.000)	.116
Order, if given SmartBox	.273	.226	.228	<b>.167</b> (.000)	<b>.144</b> (.000)	<b>.133</b> (.000)	.109
Max price willing to pay	.165	.133	.122	<b>.109</b> (.001)	<b>.084</b> (.008)	.062 (.055)	.037
Attractive in current form	.179	.130	.213	<b>.085</b> (.012)	<b>.072</b> (.021)	<b>.165</b> (.000)	.060
Picture it developed in future	.281	.220	.143	<b>.221</b> (.000)	<b>.137</b> (.000)	<b>.027</b> (.396)	.096
Ways to improve Smartbox	.212	.089	.094	<b>.204</b> (.000)	.016 (.611)	.006 (.844)	.045
Category involvement	.379	.267	.432	<b>.193</b> (.000)	<b>.142</b> (.000)	<b>.327</b> (.000)	.252
Category knowledge	.413	.259	.541	<b>.188</b> (.000)	<b>.115</b> (.000)	<b>.443</b> (.000)	.347
Category actual use	.311	.251	.376	<b>.136</b> (.000)	<b>.152</b> (.000)	<b>.292</b> (.000)	.190

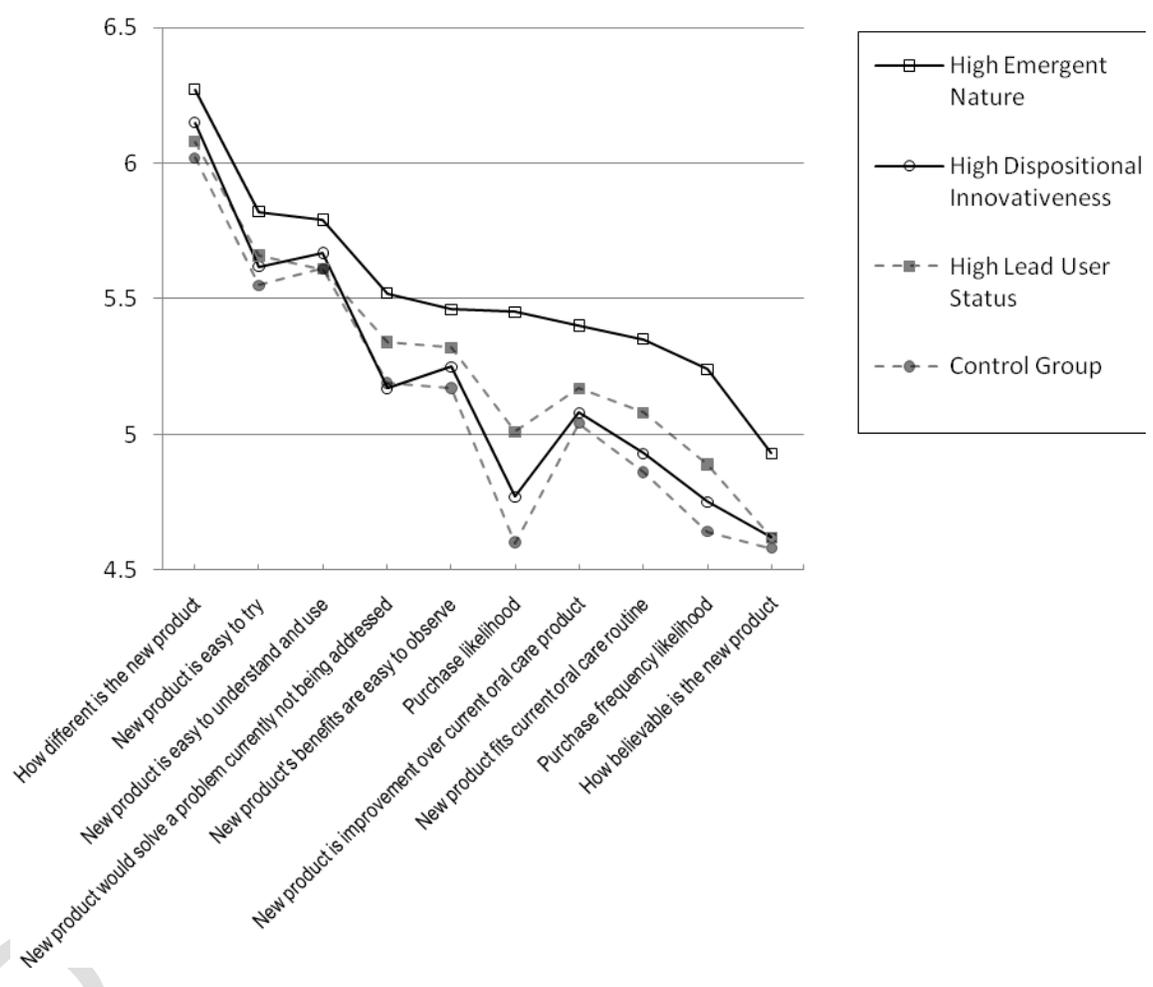
\*All correlations are significant at the 0.01 level (2-tailed). All regression models are significant at the .000 level.

**Notes:** E = Emergent nature, DI = Dispositional innovativeness, LU = Domain specific lead user

**FIGURE 1**  
**MEAN RATINGS FOR THE STUDY 2C EMERGENT NATURE AND LEAD USER**  
**SMARTBOX CONCEPTS ON FIFTEEN PRODUCT-RELEVANT ATTRIBUTES**



**FIGURE 2**  
**MEAN CONCEPT EVALUATION RATINGS FOR THE STUDY 3B ORAL CARE**  
**CONCEPTS DEVELOPED BY INDIVIDUALS HIGH IN EMERGENT NATURE,**  
**DISPOSITIONAL INNOVATIVENESS AND LEAD USER STATUS ALONG WITH A**  
**CONTROL GROUP**



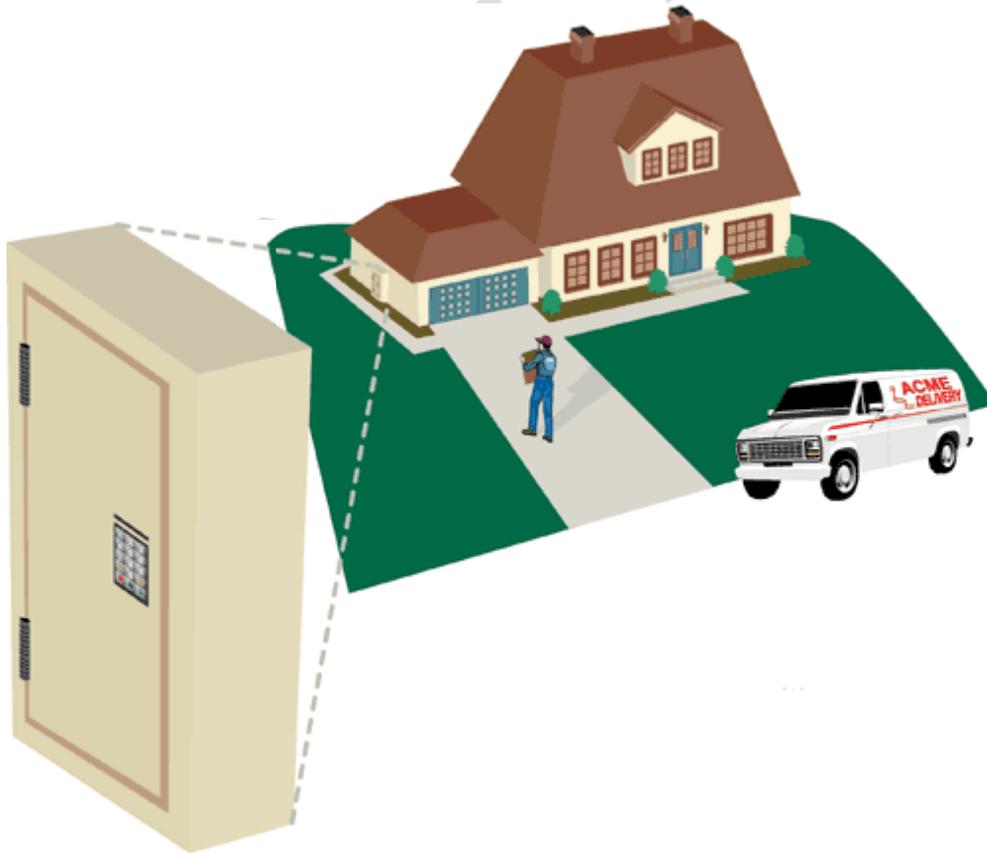
## APPENDIX A: The SmartBox Product Concept

Now we'd like you to evaluate a new product concept called the "SmartBox." The SmartBox is depicted in the drawing below.

Regardless of whether it's laundry, dry cleaning, groceries or most anything else, the SmartBox should make home pickup and delivery secure and convenient even if no one is home.

Presuming you had a choice of many styles, sizes and installation locations, please imagine that a device similar to this is on, by, or close to your home – or, if you live in an apartment, that a cluster of them is by your building. Suppose that FedEx, UPS and the Postal Service as well as grocers, drycleaners and anyone else you want to authorize could use it to make secure pickups and deliveries. Built-in intelligence enables authorized deliveries only and sends notification to both consumer and merchant whenever a delivery is made.

Thinking about the SmartBox concept, please answer the questions below.



**Appendix B:  
SmartBox Basic Description and Final Concepts Produced by the Four Groups in  
Study 2a**

**BASIC DESCRIPTION:** The SmartBox is a new device that enables secure and convenient delivery and home pickup of almost anything that can be delivered to the home (for example, groceries and laundry and many other things). Many different styles are possible and there are many different locations the SmartBox could be located in many different types of dwellings. The device is "smart" because it needs a code to be opened, so only people with authorization (like the person at home and the delivery person) can open it. It also tracks who delivered what and when and keeps a record of deliveries.

**CONTROL GROUP FINAL CONCEPT:** The SmartBox should be very easy to install, and big enough to fit a few bags of groceries in it at least. It should be easy to get access to for the delivery person and the person at home by having a scanner for the delivery person, and a code the person at home enters to open it. The main thing is convenience; if the SmartBox is not a convenience no one will use it. It must be easy to use so that most any age can do it, so there can't be a lot of instructions one wants to get access or to install it.

**HIGH LEAD USER STATUS FINAL CONCEPT:** For new homes, the SmartBox can be built to blend with the appearance of the home. Shelves inside the unit collapse upward to have room inside for large items. The SmartBox can send an email or text message to a mobile phone when a delivery has occurred. The SmartBox can also be built with a door opening from within the home so that it can be opened from inside. It has a freezer/refrigerator section for cold or frozen food deliveries and a built-in clothes hanger rack for laundry deliveries. It is easy for the owner to change the security code; the SmartBox has an alarm system that either sounds an audible alarm or sends a signal to the police in the event a thief tries to gain access.

**HIGH DISPOSITIONAL INNOVATIVENESS FINAL CONCEPT:** The SmartBox can be insulated for perishables and is available in various designs. There is a SmartBox "professional edition" that is customizable for businesses. The SmartBox is connected to email or wireless communication to the cell phone, sending an alert when packages have been delivered. A keypad allows all authorized "users" to easily access it. Authorized users would be given the code by the owner upon purchase of the item to be delivered. The SmartBox is sturdy, reliable, but not a permanent fixture.

**HIGH EMERGENT NATURE FINAL CONCEPT:** The SmartBox is offered in various sizes and is accessible from either the outside or inside of the home or apartment for convenience in retrieving deliveries. Each delivery is uniquely computer coded with a randomly generated computer code that expires soon after the delivery person accesses the SmartBox; retrieval of items by the owner is also via a unique code, with the option of a using key as well, again for convenience. The SmartBox is inconspicuous, fire proof, vandalism proof, rust resistant, and is available with options such as multiple compartments, refrigeration and an alarm mechanism similar to car alarms. The SmartBox is affordable and has purchase incentives and installation incentives for first-time customer

**Appendix C: “Fill-in-the-Blanks” Product Concept Template From Study 3A that Respondents Used To Structure Their Ideas to Further Develop a Basic Dental Spray Concept So That It Would Be Successful In the Marketplace With Typical Consumers**

BASIC IDEA FOR PROJECT ORION: Orion dental spray is a new way to clean your teeth without brushing. Instead of brushing, spray! Assume Orion will be available in a variety of sizes at reasonable prices at the stores people normally shop at.

FILL-IN-THE-BLANKS CONCEPT DEVELOPMENT FOR PROJECT ORION  
A NEW ORAL CARE PROJECT  
(Project Sahara example is [here](#) if you need help)

1. Why people will find Orion appealing. That is, what are its primary benefits? (up to 3)	
2. Why people will believe that Orion will deliver benefit 1.	
3. Why people will believe that Orion will deliver benefit 2.	
4. Why people will believe that Orion will deliver benefit 3.	
5. Additional features, if any (up to 3)	

Now take your concept development ideas and put them together into a few sentences. If you need some help getting started, just click [here](#) to see the Project Sahara example.

Your Project Orion Concept Description (limit 100 words)

## **Appendix D: Orion Dental Spray Basic Description and Final Concepts Produced by the Consumers in Study 3A**

### **BASIC DESCRIPTION**

Introducing Orion Dental Spray – the quick and convenient way to clean your teeth and have a fresh breath without brushing. You can also carry the spray in your pocket or purse when you go out. Assume Orion will be available at regular retail outlets in a variety of sizes at reasonable prices.

### **CONTROL GROUP**

Orion is easy for children to use and is more sanitary than using a toothbrush and toothpaste combination. It also works longer than regular brushing -- you no longer have to worry about the toothpaste taste in your mouth and there is no need to use water with the spray. Orion is mess free.

### **HIGH LEAD USER STATUS**

Orion eliminates the issues associated with using a brush – bleeding gums and scraping away the enamel – plus, you can do away with the toothbrush, which can harbor germs and bacteria. Use after any meal or snack throughout the day for a clean and fresh tasting mouth. Orion is a must for dentures.

### **HIGH DISPOSITIONAL INNOVATIVENESS**

Orion is an easy way to “brush” your teeth and children can take better care of their teeth almost anywhere. Instead of brushing your teeth and risk not doing it long enough, you can simply spray your teeth clean. Orion is mess free and its minty flavor tastes great and eliminates the use of mouthwash.

### **HIGH EMERGENT NATURE**

Orion simply sprays away plaque and tartar with the flexible nozzle that directs the spray to places toothbrush can miss – the longer lasting, fresher breath feels refreshing in two great flavors. Approved by American Dental Association (ADA), the patented fluoride mixture can also strengthen your tooth enamel with regular use.

## WEB APPENDIX

### *STUDY 1 SAMPLING DETAILS*

The study 1 experiment was programmed and administered via a Web-based facility for fielding online research. A total of 8300 respondents were randomly selected from an online panel for study 1. Up to three email notifications over a one week period were used to secure cooperation, and the chance to win a \$500 prize drawing served as an incentive. Respondents were directed to a login screen for the Web-based experiment. Of the 8300 respondents that were invited, 1410 completed study 1, for a cooperation rate of 17%. Of these, 86 respondents who either spent less than five minutes or more than 75 minutes on the entire study were eliminated. This produced an initial analysis sample of 1324 respondents. We eliminated an additional 200 respondents who indicated that English was not their native language for a final analysis sample size of 1124 respondents. Of the 754 respondents in the calibration sample in study 1, 57% were female; 24% had a high school education or less, 34% had some college education, and 42% had college degrees or higher; and, 26% were between ages 18 and 30, 41% were between ages 31 and 45, and 33% were over age 45. Respondents represented 21 different countries with 62% from the United States, 20% from Canada, 7% from Australia and 4% were from the United Kingdom. As a group, respondents tend to be experienced Internet users: 55% use the Internet 20 hours a week or more, 77% started using the Internet more than five years ago, 77% have high-speed connections to the Internet (cable, DSL, satellite, etc.), 78% use the Internet to browse, research or compare products a few times a week or more, and only 13% rarely or never use the Internet to purchase products and pay for those products online. The 370 respondents in the validation sample in study 1 were highly similar demographically to the respondents in the calibration sample.

### STUDY 1 SCALE CONSTRUCTION

The seventeen items measuring emergent nature were submitted to factor analysis using the principal axis method of factor extraction and oblique rotation (direct oblimin with delta=0). Items loading above .70 were selected as being more defining of the latent construct. An iterative item-analysis procedure produced virtually identical results (items were retained if item correlations with the total scale were above .70). This procedure yielded an eight-item emergent nature scale. A principal axis factor analysis of these eight items accounted for 63% of the variation in the correlations among the items and a scree plot showed a clear elbow after one factor. Coefficient alpha was .929, lending further evidence that a consumer's emergent nature is a unidimensional construct that can be reliably measured. For the domain-specific lead user scale, exploratory principal axis factor analysis and iterative item analysis produced a five-item scale. A principal axis factor analysis of the five items accounted for 73% of the variation in the correlations; the scree plot clearly showed one dominant factor. Reliability was also high (.931). Table W1 summarizes construct reliability results.

**TABLE W1: CONSTRUCT RELIABILITY IN THE STUDY 1 CALIBRATION AND VALIDATION SAMPLES**

Scale:	Valid Range	Number of Items:	Calibration Sample (n=754)		Validation Sample (n=370)	
			Coefficient alpha	Mean (Std. Dev)	Coefficient alpha	Mean (Std. Dev.)
Emergent Nature	(8, 56)	8	.929	36.76 (9.74)	.937	37.11 (9.88)
Dispositional Innovativeness	(8, 56)	8	.830	33.43 (8.50)	.801	33.89 (7.86)
Domain-specific Lead User	(5, 35)	5	.931	14.48 (7.66)	.930	14.86 (7.84)

\*All items were measured on 7-point strongly disagree-strongly agree scale

*STUDY 1 CONSTRUCT VALIDITY*

The means of the summed scales and measured variables for the combined ( $n=1124$ ) sample appear in table W2.

**TABLE W2: MEANS OF STUDY 1 SUMMED SCALES AND MEASURED VARIABLES FOR THE COMBINED (N=1124) SAMPLE**

Measure*:	Items	Valid Range	Mean	Standard Deviation	Coefficient Alpha
Emergent Nature	8	(8,56)	36.88	9.78	.93
Dispositional Innovativeness	8	(8,56)	33.58	8.30	.82
Domain-Specific Lead User	5	(5,35)	14.61	7.72	.93
Experiential Thinking Style	12	(12,60)	43.39	6.94	.86
Rational Thinking Style	12	(12,60)	44.42	7.15	.85
Reflection	12	(12,60)	40.64	9.89	.92
Openness to Experience	12	(12,60)	41.96	7.28	.77
Verbal Processing	11	(11,55)	39.22	6.44	.80
Visual Processing	11	(11,55)	39.50	5.96	.76
Creativity (self-perceived)	3	(3,15)	11.54	2.85	.94
Creative Personality*	30	(-12,18)	4.57	3.87	.78
Optimism	2	(2,14)	10.33	2.94	.91
Impulse Buying	9	(9,63)	34.29	12.69	.93
Attitude toward SmartBox	4	(4,28)	22.29	5.34	.93
Adopt if given free	1	(1,7)	5.30	1.67	-
Use if given free	1	(1,7)	5.50	1.61	-
Order, if given SmartBox	1	(1,7)	5.16	1.71	-
Attractive in current form	1	(1,7)	4.77	1.45	-
Max price willing to pay	1	(1,5)	2.54	1.27	-
Picture it developed in future	4	(4,28)	23.13	4.87	.94
Ways to improve SmartBox	1	(1,20)	3.18	2.97	-
Category involvement	3	(3,21)	14.16	4.98	.95
Category knowledge	3	(3,21)	12.79	5.20	.94
Category actual use	1	(1,6)	3.04	1.24	-

\*All measures used seven-point rating scales except the following: Rational and Experiential Thinking Style and Verbal and Visual Processing Style and self-perceived creativity were measured on five-point definitely false-definitely true scales. Creative personality was measured by means of a 30-item check-list. Reflection and openness to experience were measured on five-point strongly disagree-strongly agree scales.

Table W3 displays the correlations and means of emergent nature, dispositional innovativeness and domain-specific lead user status with demographics.

**TABLE W3: CORRELATIONS AND MEANS OF EMERGENT NATURE, DISPOSITIONAL INNOVATIVENESS AND DOMAIN-SPECIFIC LEAD USER STATUS WITH DEMOGRAPHICS**

	Correlations		
	Emergent Nature	Dispositional Innovativeness	Domain-Specific Lead User Status
Age	-.076*	-.095**	-.098**
Education	.085**	.010	.073*
Men	37.81 (9.03)	15.83 (7.73)	32.06 (7.5)
Women	36.18 (10.26)	13.70 (7.59)	34.71 (8.68)
Effect size $\eta_p^2$ (p-value)	.007 (.006)	.019 (.000)	.025 (.000)
Australia	34.73 (9.30)	12.96 (6.77)	33.17 (7.35)
Canada	35.08 (9.54)	13.33 (7.06)	32.18 (8.04)
United Kingdom	36.77 (9.83)	14.51 (8.59)	36.57 (8.51)
United States	37.33 (9.99)	14.82 (7.80)	33.88 (8.54)
All other countries	39.87(7.45)	18.01 (8.08)	33.01 (6.57)
Effect size $\eta_p^2$ (p-value)	.017 (.001)	.021 (.000)	.012 (.010)

\*\*Correlation is significant at the 0.01 level. \* Correlation is significant at the 0.05 level. All tests are two-tailed.

Table W4 presents the means and effect sizes from fitting a main-effects model fit to each personality trait and information process scale with consumers high in emergent nature, lead user status, dispositional innovativeness or below the median on all three as the four mutually exclusive factors. Effect sizes between .01 and .06 are small, .06 to .13 moderate and above .13 large. Since only four groups are of interest, we used a series of least significant difference tests with a  $p < .008$  (.05/6) to test differences among pairs of means.

**TABLE W4: MAIN-EFFECTS MODEL RESULTS FOR MEANS ON VALIDATION SUMMED SCALES BY MEDIAN SPLITS OF EMERGENT NATURE, DISPOSITIONAL INNOVATIVENESS (DI) AND DOMAIN-SPECIFIC LEAD USER STATUS**

	High Emergent Nature n=84	High DI n=129	High Lead User Status n=134	Control Group n=225	Effect size $\eta_p^2$ (p-value)
Experiential Thinking Style	44.23	43.29	40.78	42.30	.063 (.000)
Rational Thinking Style	47.18	42.27	40.73	42.38	.125 (.000)
Reflection	43.77	37.79	38.13	36.48	.110 (.000)
Openness	44.11	41.21	38.72	38.78	.143 (.000)
Verbal Processing	39.17	38.45	36.49	37.30	.095 (.000)
Visual Processing	41.14	38.67	37.04	38.03	.075 (.000)
Creativity (self-perceived)	12.01	10.53	10.38	10.16	.174 (.000)
Creative Personality	5.82	3.91	3.39	2.64	.119 (.000)
Optimism	10.80	10.01	9.93	9.42	.067 (.000)
Impulse Buying	28.79	36.12	34.15	30.00	.064 (.000)

#### *STUDY 2A SAMPLING DETAILS*

The study 2a online bulletin board discussion group study was programmed and administered via a Web-based facility for fielding online research. Participants from study 1 were grouped according to the procedures described in the text and then fifty respondents from each group were randomly selected, emailed and invited to participate in an online bulletin board study involving the further development of a concept for the SmartBox. Participants sampled from each group were told that the study represented an important followup to the SmartBox study they had previously completed (study 1) and that up to eight participants would be selected for the study. They were informed that participation required registering by a specified Monday and participating a least twice a day at any time of the day and for as much or as little time as

they chose on Tuesday, Wednesday and Thursday of that same week, followed by completing a short survey on Friday.

All four groups were conducted in four separate, but identical bulletin boards. The groups had no knowledge that other bulletin board groups were also in progress. The study was conducted asynchronously. During the study, participants were instructed to “further develop the SmartBox concept so that it will be successful in the marketplace as a home delivery solution for average consumers” and to “develop the concept so that the SmartBox will be as appealing as possible to the average consumer for the home delivery of goods and that they will want to buy it.” Participants were encouraged to both build on others’ ideas and question those ideas and could log on at any time of their choosing and post their ideas. The bulletin board reflected a detailed running log of the participants’ contributions. Participants had the option of rating each idea on a seven-point scale, commenting on ideas, sorting ideas by ratings, and building on ideas they liked the best. Participants registered for the online bulletin board study on Monday; the bulletin board was opened at 8 AM CST on Tuesday and then closed at midnight CST on Thursday. At the end of each day, participants received an email summarizing that day’s activity (i.e. idea posts and comments) to date, and the bulletin board itself had a dynamically updated summary of the activity. From Tuesday through Thursday, participants were quite active, visiting the online bulletin board an average of nine times each and posting an average of four concepts and 10.5 comments each. Participants developed and refined multiple concepts, and iterated until they had a single SmartBox concept that they believed would be the most appealing to the average consumer when introduced into the market. Following completion of the three-day concept development task, on Friday each participant completed the scales described in the text.

A total of 24 respondents completed the study, six in the high lead user group, six in the high innovativeness group, six in the high emergent nature group and six in the control group. We had nearly equal numbers of male and female participants (51% female; 49% male); 14% had a high school education or less, 37% had some college education, and 49% had college degrees or higher; 17% were between the ages of 18-30, 52% were between ages 31 and 45 and 31% were over age 45. The study was restricted to native English speaking respondents: 69% were from the United States, 23% from Canada and 8% from the United Kingdom. Each participant received a payment of \$50 for completing the study.

#### *STUDY 2B SAMPLING DETAILS*

The study 2b experiment was programmed and administered via a Web-based facility for fielding online research. A total of 3315 native English speaking respondents from the United States were randomly selected from an online panel for study 3. Respondents who had participated in studies related to the topic in this research were excluded from the sampling frame. Up to three email notifications over a five-day period were used to secure cooperation, and the chance to win a \$300 prize drawing served as an incentive. Respondents were directed to a login screen for the Web-based experiment. Of the 3315 respondents that were invited, 631 completed study 3, for a cooperation rate of 19%. Of the 631 respondents in study 3, 65% were female; 19% had a high school education or less, 38% had some college education, and 43% had college degrees or higher; and, 22% were between ages 18 and 30, 38% were between ages 31 and 45, and 40% were over age 45. As a group, respondents tend to be experienced Internet users: 62% use the Internet 20 hours a week or more, 86% started using the Internet more than five years ago, 81% have high-speed connections to the Internet (cable, DSL, satellite, etc.), 79%

use the Internet to browse, research or compare products a few times a week or more, and only 8% rarely or never use the Internet to purchase products and pay for those products online.

### *STUDY 2B MODEL DETAILS*

We used the following random effects regression model to account for unobserved heterogeneity where the composite score of respondent  $i$  for concept  $j$  was the dependent variable and the independent variables were three dummy variables representing the four concepts. The left out dummy variable was the concept developed by the high emergent nature group:

$$CScore_{ij} = \beta_0 + \beta_1(Average_i) + \beta_2(Lead_i) + \beta_3(Inn_i) + \theta_j + \varepsilon_{ij}$$

where,

$CScore_{ij}$  = Composite score for concept  $i$  by respondent  $j$

$Average_i$  = 1, if concept  $i$  was developed by the Average group, otherwise 0

$Lead_i$  = 1, if concept  $i$  was developed by the High Lead User group, otherwise 0

$Inn_i$  = 1, if concept  $i$  was developed by the High Innovate group, otherwise 0

$\theta_j$  = Respondent  $j$ 's specific effect on the composite score  $\sim$  Normal(0,  $\tau_1^2$ )

$\varepsilon_{ij}$  = error  $\sim$  Normal(0,  $\tau_2^2$ )

We test model significance by constructing a null model which includes the intercept ( $\beta_0$ ) and the respondent specific effects ( $\theta_j$ ).

### *STUDY 2C SAMPLING DETAILS*

The study 2c experiment was programmed and administered via a Web-based facility for fielding online research. A total of 1067 native English speaking respondents from the United States were randomly selected from an online panel and directed to a login screen for the Web-based experiment. Respondents who had participated in studies related to the topic in this

research were excluded from the sampling frame. Up to three email notifications over a five-day period were used to secure cooperation, and the chance to win a \$300 prize drawing served as an incentive. Of the 1067 respondents that were invited, 192 completed study 2c, for a cooperation rate of 18%. Of the 192 respondents in study 4, 41% were female; 17.5% had a high school education or less, 35% had some college education, and 47.5% had college degrees or higher; and, 16% were between ages 18 and 30, 35% were between ages 31 and 45, and 49% were over age 45. As a group, respondents tend to be experienced Internet users: 60% use the Internet 20 hours a week or more, 85% started using the Internet more than five years ago, 81% have high-speed connections to the Internet (cable, DSL, satellite, etc.), 77% use the Internet to browse, research or compare products a few times a week or more, and only 5% rarely or never use the Internet to purchase products and pay for those products online.

### STUDY 3B MODEL DETAILS

Individual specific effects are taken into consideration via the following random effects regression model.

$$CScore_{ij} = \beta_0 + \beta_1(Average_i) + \beta_2(Lead_i) + \beta_3(Inn_i) + \sum_{k=4}^9 \beta_k X_k + \theta_j + \varepsilon_{ij}$$

where,

$CScore_{ij}$  = Composite score for concept i by respondent j

$Average_i$  = 1, if concept i was developed by the Average group, otherwise 0

$Lead_i$  = 1, if concept i was developed by the High Lead User group, otherwise 0

$Inn_i$  = 1, if concept i was developed by the High Innovate group, otherwise 0

$X_k$  = Individual specific variable (lead user status, innovativeness, emergent nature, involvement, category knowledge, impulse buying behavior, mood, age, and gender)

$\theta_j$  = Respondent j's specific effect on the composite score  $\sim$  Normal(0,  $\tau_1^2$ )

$\varepsilon_{ij}$  = error  $\sim$  Normal(0,  $\tau_2^2$ )