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## EMPATHIC LEAD USERS: THE EFFECTS OF EXTRAORDINARY USER EXPERIENCES ON CUSTOMER NEEDS ANALYSIS AND PRODUCT REDESIGN

Joseph Lin  
josephl@mail.utexas.edu

Mechanical Engineering Department  
The University of Texas at Austin  
Austin, TX 78712

Carolyn Conner Seepersad  
ccseepersad@mail.utexas.edu

### ABSTRACT

An experiment was conducted to investigate the effectiveness of empathic lead user analysis for uncovering latent customer needs that could lead to breakthrough product ideas. Empathic lead users are defined as ordinary customers (or designers) who are transformed into lead users by experiencing the product in radically new ways, via extraordinary user experiences. These extraordinary experiences may include modifications of the usage environment or the way in which the customer interacts with the product. A procedure for designing and conducting empathic lead user interviews is introduced in this paper. Results are reported for a trial study in which the empathic lead user technique is compared with verbal and articulated use interviews for a common consumer product (a two-person tent). Empathic lead user interviews are observed to have a significantly positive effect on latent needs discovery in the trial study, leading to a five-fold increase in latent needs discovery relative to articulated use interviews with a prototype and a twenty-fold increase relative to verbal interviews without a prototype. Empathic lead user interviews emerge as a promising tool for supporting innovation and breakthrough concept generation.

### 1. INTRODUCTION

If diversity of perspective ignites design team innovation, then imagine the impact of transforming a host of ordinary customers into fellow innovators—veritable fountains of breakthrough product ideas. Unfortunately, conventional customer needs analysis techniques—including focus groups, surveys, and interviews [1,2]—often focus customers on obvious or incremental changes in a product (e.g., size, color). Even if the interviews are conducted expertly, customers seem to be limited either by their previous experiences with a

product or by their inability to think outside the box and imagine truly innovative and non-obvious changes to a product.

One solution to this dilemma is to conduct customer interviews with *lead users*—customers who push a product to its limits, experience needs prior to the general population, and benefit significantly from having those needs fulfilled [3,4]. However, these lead users are often difficult to find in large numbers and may suggest concepts for niche products or higher-end products, rather than innovative versions of more mainstream products.

Another solution is *empathic design*, in which observations and interviews are conducted in the customer's own environment [5]. By observing customers using products in everyday applications and usage contexts, designers may identify difficulties that customers may not even recognize and certainly fail to mention in traditional focus groups. However, empathic design techniques still rely heavily on the designer's powers of observation and innovation, and fall short of stimulating customers *themselves* to think outside the box.

A novel approach to this dilemma is to interview empathic lead users. Empathic lead users are defined as ordinary customers (or designers) who are transformed into lead users by experiencing the product in radically new ways, via extraordinary user experiences. These extraordinary experiences may include modifications to the usage environment (surfaces, noise, light, etc.) or modifications to the way in which the customer interacts with the product (e.g., limited visibility via darkness, blindfolding, or dark glasses; limited hearing via earplugs or background noise; limited dexterity via various types of gloves or mitts; limited strength via strap-on weights or joint wraps, etc). As highlighted by Hannukainen and Holttä-Otto [6], such extraordinary user experiences are designed to break the mold of the customer's thought process and usage pattern, thereby encouraging them to

think about the product in new ways and to consciously articulate the types of latent needs that lead to breakthrough products. They are intended to create empathic lead users by encouraging customers (as well as designers) to push the boundaries of the typical usage environment—especially the way in which the customer interacts with the product—and physically place themselves in those settings. By breaking the routine of typical usage, empathic lead users become innovators themselves, suggesting breakthrough ideas for mainstream products.

### 1.1 Related Work

The overall purpose of empathic lead user studies is to make customer needs analysis techniques more effective for uncovering latent needs. In contrast to direct needs, which tend to be obvious to the customer and lead to incremental changes in a product, latent needs may be very non-obvious and very difficult to uncover [7]. Customers may not be consciously aware of latent needs, but they are surprised or delighted if they are fulfilled. Examples may include the first intermittent windshield wipers or vibrating cell phones; both features were welcomed by consumers but unlikely to be mentioned in typical customer interviews with pre-existing products. The effectiveness of customer needs analysis techniques for uncovering latent needs seems to be related to several aspects of the customer experience, including product representations, previous user experiences, and customer-product interaction modes.

Most authors seem to agree that functional prototypes are important for uncovering latent customer needs. Otto and Wood [7] suggest articulated use interviews—in which customers are interviewed while using a product or functional prototype—as a means of gathering latent (and direct) customer needs. Leonard and Rayport [5] and von Hippel [3] suggest that traditional methods for gathering customer needs (e.g., verbal customer interviews, questionnaires, and focus groups) rarely result in novel product concepts. Instead, they suggest empathic design methods in which designers directly observe customers using the product, so that designers can better understand the environment in which the product is used, the circumstances that trigger its use, and any unarticulated needs or problems with the product. Empathic designers rely on visual or sensory cues, such as body language, in addition to verbal articulation for evidence of latent needs. For example, Booyesen and coauthors [8] cite the effectiveness of functional prototypes for gathering customer needs during the development process for an anesthetic mouthpiece and attribute much of the effectiveness of prototypes to the capability to “get inside the heads of customers by observing them using the product in the real world.” In an apparently contradictory report, Soderman [9] reported only minor differences between customer evaluations of real cars versus virtual reality representations and sketches. However, he aimed to measure customer *understanding* of a new product rather than the results of a customer needs analysis, and his results seemed to

be influenced very strongly by a high level of customer familiarity with the product before the interview.

As suggested by Soderman [9], prior user experience with a product seems to have a strong influence on the effectiveness of customer needs analysis. In his seminal work on lead users, Von Hippel [3] argues that designers should interview lead users who typically have extensive experience with a product, encounter customer needs earlier than the general population, and possess a vested interest in obtaining a solution to those needs. These lead users are better positioned than typical users to provide a richer understanding of customer needs and more likely to offer suggestions for innovative product concepts [4]. Lead users are not always easy to utilize, however, because they are less plentiful and more difficult to locate than typical users and because their suggestions may be more appropriate for niche markets than the general marketplace.

Hannukainen and Holtta-Otto [6] broadened the classification of lead users to include disabled persons. They note that disabled users may include not only those with genuine physical disabilities (e.g., blindness, deafness, impaired mobility) but also persons with situational disabilities, defined as ordinary users operating in extraordinary environments. Examples of situational disabilities include operating in dark or noisy environments that make it difficult to see or hear. Hannukainen and Holtta-Otto find that both types of extraordinary users are promising sources of latent needs. Similarly, Leonard and Rayport [5] report that a group of young designers at Interval Research Corporation in Palo Alto, California, were outfitted with fogged glasses, gloves, and weights on their arms and legs so they could feel what it would be like for the very elderly to operate prototype physical controls. The situational disabilities allowed the young researchers to apply their knowledge of design within constraints that they could not otherwise personally experience. In a similar setting, Ford engineers developed a simulation suit with goggles, ear plugs, thick gloves, and arm and leg weights and motion restrictors to help their young engineers understand the challenges faced by older drivers [10]. IDEO designers use similar empathy tools to better understand the needs of users in particular contexts [11]. Accordingly, successful discovery of latent customer needs seems to be influenced by *the way in which a customer interacts with the product* in typical usage contexts and during the customer interview.

We introduce the concept of *empathic lead user* to refer to customer needs analysis techniques that transform ordinary customers or designers into lead users by creating opportunities for them to interact with products under extraordinary circumstances. Those extraordinary circumstances are intended to trigger non-obvious, creative feedback by helping users break their habitual modes of interacting with and thinking about a product. Accordingly, we hypothesize that empathic lead users will realize and articulate latent needs earlier than the general population, similarly to other lead users. As a result, designers—who serve as observers and possibly participants in the studies—will develop a richer, *empathic*

understanding of latent customer needs that lead to breakthrough products.

Although the concept of an empathic lead user has been suggested in the literature by other terms (e.g., [10,5,11,6]), formal studies have not been published that prescribe a detailed procedure for the technique or compare its effectiveness to that of conventional techniques.

## 1.2 Overview of Empathic Lead User Study

The goal of the empathic lead user study was to answer the questions, “*Will an empathic lead user technique impact the effectiveness of uncovering latent needs in customer interviews, relative to articulated use and verbal interviews? And if so, in what way?*” Our hypothesis was that it does have an impact and, specifically, that the rate of discovery of latent needs will increase, along with the depth and breadth of customer needs obtained. A systematic study was designed and executed to compare the rate of latent needs discovery from three alternative customer needs analysis techniques: (1) an empathic lead user interview, (2) an articulated use interview in which customers interacted normally with a prototype during the course of the interview, and (3) a verbal interview in which customers were not permitted to interact with a prototype in any way. In the articulated use interview, ordinary customers were asked to assemble a two-person tent. In the empathic lead user interview, the same customers were asked to assemble the tent under extraordinary conditions, namely, in the dark and with oven mitts on their hands to simulate extraordinary conditions (e.g., dusk on a cold day) or extraordinary users (e.g., partial blindness or arthritis). We carefully recorded the customer needs and analyzed the depth and breadth of the responses as well as the rate of discovery of latent needs. The results indicate a significant increase in latent needs discovery with the empathic lead user technique. Further insights are provided in Section 4, following a detailed discussion of the experimental methodology in Section 2 and the results in Section 3.

## 2. EXPERIMENTAL METHODOLOGY FOR THE EMPATHIC LEAD USER STUDY

We created a step-by-step methodology for investigating the effectiveness of empathic lead user studies. The methodology is appropriate not only for comparing empathic lead user studies with articulated use studies but also for implementing the empathic lead user technique on a designer’s own problems. In the rest of this section, we describe the general steps of the study and our implementation of them for the present study.

**Step 1.** *Identify the product to be redesigned and the scope of the redesign opportunity.* Since the purpose of the study was to elicit latent needs from ordinary customers, we sought a common product with identifiable opportunities for original, breakthrough design. We began by identifying a breakthrough product that was launched recently and remained unfamiliar to



**Figure 1.** Sako inflatable tent from Nemo Equipment [12].



**Figure 2.** REI Camp Dome 2 tent [13].

most customers, along with a pre-existing, standard version of the product. If most people were unfamiliar with the breakthrough product, then we could perform needs analysis on the standard design to see if the characteristics of the breakthrough product (or alternative breakthrough products) could be uncovered.

As our breakthrough product, we identified the Sako tent from Nemo Equipment, as illustrated in Figure 1 and featured in the 2005 “Best of What’s New” section of *Popular Science* magazine [12]. The tent features air-filled support beams that can be inflated in only 45 seconds with a simple foot pump. Local customers were very unlikely to have encountered it because of its five hundred dollar price tag and lack of availability at any retailer in Texas. The standard design was an REI Camp Dome 2 tent [13], as shown in Figure 2. The tent uses conventional means of support, with two shock-corded aluminum poles that are clipped onto the tent fabric to compose the frame of the tent. The canopy fabric is composed of nylon taffeta and the floor is coated nylon, making the tent waterproof and lightweight according to the manufacturer. This tent is advertised for use in three-season backpacking, with a two-person sleeping capacity, two doors, and a retail price of \$99. These characteristics and its availability at local REI retailers made it an ideal standard design example, and we purchased it for use in the customer interviews.

**Step 2.** *Carefully define the characteristics of the typical customer, application, and usage environment.* To define a typical usage context, we recommend the contextual needs assessment methodology introduced by Green and coauthors

[14] to account for context factors associated with the application, the environment, and the customer. For the standard, two-person tent, the typical user would be a weekend camper, 15-30 years old, with very good health and physical fitness, who camps a few times a year. The typical usage environment would be a public park or wilderness area, in a generally wooded or grassy environment with warm, sunny weather.

**Step 3.** *Identify customers who meet the target demographic and conduct articulated use interviews with them in a typical usage environment.* For the tent example, we recruited twenty undergraduate student volunteers. There were ten engineering students and ten non-engineering students and eleven males and nine females. Most of the participants reported only occasional tent use, and no one qualified as a lead user of the product. The interviews were conducted individually in a campus building and lasted approximately 45 minutes. One half of the customers were interviewed both before being introduced to the product and while using the product, and one half of the customers were interviewed only while using the product. The purpose of this division was to assess the impact, if any, of the presence of a prototype during the articulated use interview. Interviews conducted without the prototype are referred to as *verbal interviews* in this study; interviews conducted with the prototype under normal conditions are referred to as *articulated use interviews*.

Each verbal interview was conducted in two sections: a free speech interview, followed by categorical questioning. In the free speech period, we asked customers to respond freely to the question, "If you were to purchase an ideal tent, what main characteristics would you look for?" We recorded all of the answers directly and verbatim, as the customer was allowed to speak freely and unprompted. We followed the free speech section with categorical questioning. We identified eleven categories of needs for categorical questioning: size, shape, weight, material, safety, durability, aesthetics, ergonomics, cost, setup, and transport. We derived the categories from our experiences with the product, a systematic review of the most common customer need categories in past undergraduate design methodology reports (for ME 366J, Mechanical Design Methodology, at UT Austin), and from the general requirement list categories (e.g., geometry, kinematics, forces, signals, ergonomics) suggested by Pahl and Beitz [15]. As part of the categorical questioning section, we addressed each of the categories in a separate question to the customer, "With respect to (size/shape/weight...), can you tell me more about what you expect from the product?" Throughout the free speech and categorical interviews, we probed for more information with questions such as, "In your free speech interview, you mentioned that the product had to be small. Can you elaborate on this concern?" All questions were designed not to bias the participant towards particular answers, but formal triangulation procedures were not used. The articulated use portion of the interview was conducted according to the procedure described by Otto and Wood [7].

**Step 4.** *Identify extraordinary user experiences that are likely to occur and deviate from the experiences of a typical customer in a typical application and usage environment.* For the tent example, likely deviations from the typical usage environment may include rainy conditions, dark conditions, extremely cold or hot (desert) weather, windy conditions, or rocky soil. Likely deviations from the typical customer may include children, injured or exhausted hikers, or physically challenged individuals (with limited strength, dexterity, range of motion, sight, hearing, etc.) Examples of likely deviations from the typical application include extended term camping or temporary shelter or use as a sunshade and play area for infant children and toddlers at outdoor activities such as soccer tournaments.

**Step 5.** *Devise methods for simulating extraordinary user experiences with typical users.* For the tent example, we chose to concentrate on extraordinary usage environments, namely unusually cold and dark conditions. To simulate these conditions with ordinary users, we asked the users to assemble the tent in a dark room and with oven mitts on their hands. Although they were intended to resemble the heavy gloves that are necessary in cold weather, the oven mitts could also have simulated limited dexterity, for example, in an arthritic user. To simulate other extraordinary environments, we could have utilized sprinklers (for rain) or concrete (for rocky conditions). To simulate extraordinary customers, we could have attached weights to the user's arms and legs and wrapped their joints to simulate injury, exhaustion, or limited strength or dexterity. Also, we could have asked the user to simultaneously perform another mental task (e.g., carrying on a cell phone conversation or solving simple math problems in his/her head) to simulate distractions or limited mental maturity (e.g., with children).

**Step 6.** *Conduct empathic lead user interviews with simulated extraordinary experiences.* We began by darkening the experiment room and asking the customers to wear oven mitts. We asked them to assemble the tent while we repeated the free speech interview from Step 3. We recorded all comments directly and verbatim and probed for more information by following up on all significant comments. We followed the interview protocol for articulated use interviews described by Otto and Wood [7].

**Step 7.** *Interpret and compare the results of the two interviews.* We sought to compare the breadth and depth of the direct customer needs and the relative number of latent needs uncovered by the alternative techniques. First, we sought to distinguish direct from latent customer needs. For the purposes of categorical questioning, we had already created a list of direct needs categories, which are recorded in the columns of Table 1. If a reported customer need represented a significant change to the product design and did not match the categories in Table 1, then it was labeled as a latent need. Latent needs were also identified when a reported customer need represented an innovative insight into the product and/or product usage conditions.

To quantify the breadth of the reported direct customer needs, we counted the number of direct customer needs categories covered by each customer. We also counted the number of comments in each category. Table 1 is provided as an example of how the breadth analysis was performed. The customer numbers are listed in the first column, and the needs categories are listed in the remaining columns. We tallied each customer's direct needs statements according to the general category of the comment. For example, a comment suggesting that the tent is too small earns a tally under the size category.

**Table 1.** Categories of direct customer needs.

Customer #	Direct Needs Categories										
	Size	Shape	Weight	Material	Safety	Durability	Aesthetics	Ergonomics	Cost	Setup	Transport
X	1	0	0	0	0	0	0	1	1	1	0

The next step was to evaluate the depth of the customer need statements. This was much more difficult to quantify because of the variation in detail among customer statements. We addressed this challenge by creating a grading rubric, as presented in Table 2, for analyzing the specificity of each customer need statement. If the customer had no comment on a specific category (from Table 1), a score of zero was assigned. A score of one was assigned to an answer that generalized the category, characterized by words such as “big” or “small” if referring to size. A score of two was earned for answers that described a range, such as “portable” or “hand-held”. These answers could also be characterized by comparative statements to known values. If the interviewer could determine what the customer wanted based on a comparison to a commonly understood size, weight, or other characteristic, it was awarded a two. Finally, a score of three indicated that the design team had the most confidence in what the customer desired. These answers included actual dimensions and/or specifications and were very definite, indicating the customer had very specific requirements for the category.

**Table 2.** Rubric for evaluating the depth of customer needs.

Design Team Certainty	Score
No Comment	0
General Statement (i.e. Big, Small)	1
Comparative Statement (i.e. portable, handheld)	2
Specific Statement (i.e. dimensions, specification)	3

### 3. EXPERIMENTAL RESULTS FOR THE EMPATHIC LEAD USER STUDY

We executed the study according to the step-wise procedure in Section 2. All of the customers participated in an articulated use interview, followed by an empathic lead user interview. One half of the customers also participated in a verbal interview (without the prototype) prior to the articulated use interview. We carefully recorded all of the customer need statements and used them to calculate depth, breadth, and latent needs metrics, according to the procedure described in Section 2, Step 7. The results are displayed in Tables 3-7 and Figure 3. The mean values for each metric are displayed in Table 3. The results of a statistical analysis are displayed in Tables 4-7. The statistical analysis was performed for each metric and for each pair of interview techniques (e.g., articulated use versus empathic lead user). The statistical analysis was designed to test the null hypothesis that the mean metric values were equal for each pair of interview techniques (versus the two-sided, alternative hypothesis that they were not equal). The statistical analysis was based on a *t* test on two means with unknown and unequal population variances [16], with corrected degrees of freedom for each comparison calculated accordingly and reported in the tables. P-values were also calculated for each comparison to quantify the probability of obtaining the observed means if the samples were drawn from identical distributions, with smaller P-values reinforcing the conclusion that the population means were not equivalent. Based on the results, we made three sets of conclusions, described as follows.

**Table 3.** Mean values of depth, breadth, and latent need metrics.

Interview Technique	Depth	Breadth (# of Categories)	Breadth (# of Comments)	Latent Needs
Verbal	1.7	4.2	5.4	0.2
Articulated Use	1.7	5.7	10.5	0.9
Empathic Lead User		1.6	8.0	5.6

**Table 4.** Statistical analysis of latent need metric.

	Articulated Use			Empathic Lead User		
	dof	t-statistic	P-value	dof	t-statistic	P-value
Verbal	25	-2.0	5.4E-02	24	-8.98	<1E-4
Articulated Use				27	-7.7	<1E-4

**Table 5.** Statistical analysis of breadth metric, measured by number of comments.

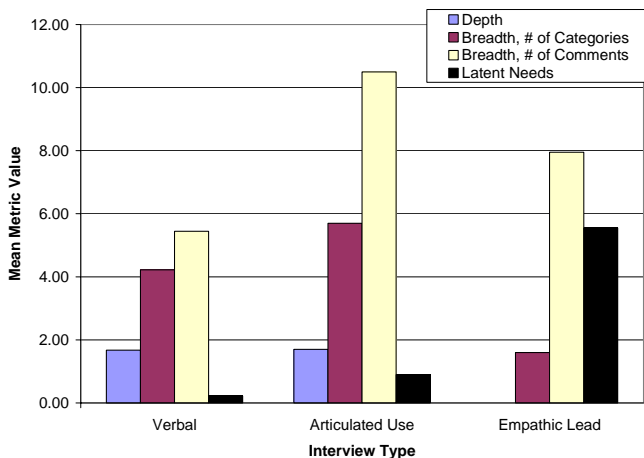
	Articulated Use			Empathic Lead User		
	dof	t-statistic	P-value	dof	t-statistic	P-value
Verbal	21	-4.7	1.0E-04	23	-2.2	3.9E-02
Articulated Use				38	2.3	2.5E-02

**Table 6.** Statistical analysis of breadth metric, measured by number of categories.

	Articulated Use			Empathic Lead User		
	dof	t-statistic	P-value	dof	t-statistic	P-value
Verbal	14	-2.3	3.7E-02	10	4.5	1.1E-03
Articulated Use				30	10.8	<1E-4

**Table 7.** Statistical analysis of depth metric

	Articulated Use		
	dof	t-statistic	P-value
Verbal	9	-0.4	0.7



**Figure 3.** Depth, breadth, and latent need metrics versus interview type.

For this particular product and customer population, empathic lead user interviews had a significantly positive effect on our ability to uncover latent needs, resulting in a **five-fold**

increase in latent needs over articulated use interviews with a prototype and a **twenty-fold increase over verbal interviews** without a prototype. The strength of the results suggests that the observed effect may be more general, but further study of a broad variety of products and customers is needed to support this hypothesis. In this study, most of the customer complaints and suggestions centered around issues of safety and ease of setup. These issues were magnified in the empathic lead user scenario, when darkness and oven mitts were imposed on the customers. Surprisingly, Customer 18 foreshadowed the Nemo tent by suggesting the inflatable technology commonly used in emergency rafts or flotation devices during her lead user interview. Customer 13 suggested an innovative idea of integrating the tensegrity technology common to automobile windshield shades into the tent frame. The challenge of finding and manipulating the pole clips and corner grommets under the lead user experience also facilitated latent need discovery. Customers named “contrasting material and clip colors”, “patterning at the clips”, “markers for the corners”, “glow-in-the-dark clips and grommets”, as well as “rougher coating to increase friction on the poles” as potential improvements after having experienced the lead user scenarios. In addition, the use of the oven mitts led to comments related to manual dexterity that required the clips to be enlarged for easier grasping and handling. The lead user scenario exaggerated setup difficulties, thereby surfacing latent needs and increasing suggestions for breakthrough improvements, as a result. Strikingly, the Nemo Sako tent concept and other user-friendly tent concepts could have been derived from these twenty empathic lead user interviews.

Articulated use and empathic lead user interviews yielded higher breadth of customer need comments than verbal interviews alone, for this product and customer population. The breadth of answers was evaluated based on the number of direct needs categories achieved and the total number of direct needs comments. The results showed a strong indication of the effects of enhanced customer-product interactions. Relative to verbal interviews, the inclusion of a prototype in the articulated use interviews led to a 35% increase in the average breadth of customer needs statements, measured by the number of categories addressed, and a nearly two-fold increase, measured by the total number of distinct comments. For example, Customer 1 went from short, single-word comments such as “roomy” and “easy to build” to elaborate sentences describing the bag, poles, setup, aesthetics, and more. The lack of breadth in some of the empathic lead user interviews reflected our observations that customers tended not to repeat direct needs comments from prior interviews. Since the empathic lead user interviews followed the verbal and articulated use interviews, many customers would respond to queries with “same as before” or “nothing more to add.” Instead, the empathic lead users focused primarily on newly discovered direct and latent needs. We anticipate that an empathic lead user interview would provide similar (or possibly higher) levels of breadth, relative to articulated use interviews, if the interviews were

executed exclusively, but further research is needed. Overall, the results suggest that the use of a prototype provides better-rounded and more prolific answers from customers during interviews.

*For this particular product (with which most people were comfortably familiar), the type of interview did not significantly affect the depth (specificity) of the customer needs.* Depth metrics were not calculated for the empathic lead user interviews because customers tended to focus on latent needs and covered too few categories of direct needs to provide a meaningful measure of average depth per category. Direct needs tended to be delivered in prior verbal and articulated use interviews. Surprisingly, the depth scores show little change between the verbal and articulated use interviews. For both interviews, the average depth was approximately 1.7, reflecting a mix of primarily general and comparative statements on the grading rubric in Table 2. For example, verbal interview comments on tent size ranged from “pretty big” (Customer 1) to “able to fit two sleeping bags and two twin air mattresses and space in between to put your gear ... [and] tall enough so that I don’t have to bend over too much to get in and long enough so I can lay down and feel comfortable” (Customer 3). Some customers, however, were able to give specific dimensional requirements such as “Probably ... 8x8x8 feet” (Customer 11). From the customer comments, we observed that customer familiarity seemed to be an important factor in the consistency of the depth metric. Customers consistently provided relatively detailed needs statements without necessarily relying on a prototype. Past user experience allowed them to discuss their needs based on a previous product experience and their associated likes and dislikes. Due to the small sample size and lack of “true” lead users, it was not possible to show conclusive evidence of this influence; however, we hypothesize that the depth (specificity) of customer needs would increase with the introduction of a prototype for a relatively unfamiliar product.

#### **4. CLOSURE**

Empathic lead user interviews have a significantly positive effect on the discovery of latent needs in our study, and the strength of the results suggests that the effect may be observed more generally. By exposing customers to extraordinary experiences during the articulated use interview, we found the customers more likely to highlight difficulties and potentially innovative solutions that would not be obvious to customers in ordinary interviews. The types of innovations spawned by empathic lead user interviews may enhance usability and customer satisfaction in both extraordinary and ordinary conditions. For example, the inflatable and glow-in-the-dark technologies suggested for the two-person tent would enable tent assembly in dark or cold conditions or by persons with limited vision or dexterity; however, they may also make it faster to assemble the tent under ordinary conditions and easier to enter/exit the tent at night. Therefore, we expect the results of empathic lead user studies to make products more attractive

for the general marketplace, as well as extreme users. Based on the results of our studies, we also expect the empathic lead user technique to be useful for products at various stages of development, from stagnant products that need a facelift to innovative prototypes that could be improved even more. For example, not only the standard tent but also the Nemo tent would benefit from glow in the dark doors, windows, and fasteners, as suggested by several customers in our study.

The potential benefits for designers are profound. First, designers may be able to yield some of the benefits of lead user interviews without the challenge of identifying actual lead users, who may be scarce or difficult to locate. Furthermore, the latent needs discovered by empathic lead users may be more applicable to mainstream products than some of the niche suggestions made by extreme users, although further study is needed to support this hypothesis. In an interesting twist on the empathic lead user technique, designers may apply the techniques to themselves as potential customers—effectively using the technique as an innovation and concept generation tool in which they could bring their extensive experience and domain knowledge to bear on the problem. Further study is needed.

In light of the positive effect of empathic lead user interviews on latent needs discovery in this study, a host of questions and research opportunities are raised. The most obvious need is to expand the present study to a broader variety of products and customers. The present study included twenty student participants and one sample product. An investigation of a broader variety of products would help us investigate, for example, whether empathic lead user analysis is useful not only for consumer products but also for heavy equipment and possibly other products and systems. Combining a variety of products with a broader demographic and larger sample size of customers would help us draw more definitive and general conclusions regarding the effectiveness of the technique. Furthermore, in our study, we examined only ordinary customers. To what extent do the latent needs generated by empathic lead users resemble those of actual lead users? Would the results be comparable or complementary? Also, most of our customers were familiar with the tent product. To what extent does the customer’s familiarity with the product influence the results? A key enabler for empathic lead user studies is the design of suitable extraordinary experiences, generally in the form of situational disabilities. We implemented only two situational disabilities—darkness for limited vision and oven mitts for limited dexterity. How well will the empathic lead user techniques work for different types of extraordinary experiences, such as mental distractions? We look forward to answering many of these questions as we learn more about empathic lead user techniques.

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