

EXPERIENCE PRODUCTS: PRODUCT PROPERTIES THAT ENABLE USER EXPERIENCE

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ABSTRACT:

In *the Experience Economy*, Pine II and Gilmore (1999) advocate that enjoyable experience has been a new motivation of consumption in both production and service industries. This research presumes that products with tangible and intangible properties can also enable users to experience. User experience is beyond pleasures caused by styling, usability and/or functionality. It consists of an individual who participates in a well-staged thematic user-product interaction. This paper demonstrates how 16 “experience products” that possess particular properties enable this kind of user experience.

An adapted case study protocol was applied to collect product samples, identify the product properties that enable user experience, and classify the resulting types of user experience. Thus, we regard the relationships between the product properties and the modal experience as causal

relationships with effects of design intentions. This is a fundamental design research for developing more rigorous approaches for enabling user experience in product design.

1. INTRODUCTION

In *the Experience Economy*, Pine II and Gilmore (1999) advocate that enjoyable experience has been a new motivation of consumption in both production and service industries. This research presumes that products with tangible and intangible properties can enable users to experience. User experience consists of an individual who participates in a well-staged thematic user-product interaction. The focus of this paper is, first, to identify product properties that function as sets, props, and/or costumes staging users to experience, and secondly, to classify the resulting types of user experience. An adapted case study protocol was applied to collect purposeful product samples (Creswell 1998) and to identify the properties of experience products.

In order to analyze experience products and user experience, this research refers to four domains in the literature: (1) studies relevant to user experience, experience marketing, and emotional design. (Margolin 1997, Gupta and Vajic 1999, Pine, II and Gilmore 1999, Hassenzahl 2003, Froehle and Roth 2004, Hoven 2004, Pilke 2004, Wilson and Sasse 2004); (2) case study research methods (Eisenhardt 1989, Stake 1995, Creswell 1998, Yin 2003); (3) frameworks, models, or diagrams pertaining to human-artifact interaction (Malone 1975, Suchman 1990, Flood and Carson 1993, Preece et al. 1994, Cross 2000, Lugt 2000, Stone et al. 2000, Eppinger 2001, Jones et al. 2001, Lim and Sato 2006); and (4) studies on properties, characteristics, or attributes of products. (Janlert and Stolterman 1997, Jordan 2000, Whyte et al. 2003, Schifferstein and Cleiren 2005). Case study research methods are reviewed because they provide consistent principles for comparison across cases in order to building theories from qualitative inquiries (Eisenhardt 1989, Yin 2003). The last two domains of literature review help to thoroughly analyze product properties.

By referring to the classification of user experience, it is possible to identify product properties that enable user experience as well as to figure out what product properties can enable what kinds of user experience. As a result, designers can specifically pursue the design of a thematic user experience in addition to more traditional goals such as styling, usability and/or functionality.

2. RESEARCH APPROACHES

This research creates a case study protocol for analyzing experience products. Table 1 shows the adapted protocol and its corresponding sections of this paper. The objectives of this research are two-fold: (1) to analyze how various experience products enable user experience and (2) to identify the initial classification of user experience. Next, a rigorous definition of the cases, experience products, is considered. The experience products are chosen from existing products in the marketplace rather than conceptual designs. That is, their functionality, industrial specification, social value, and design quality are already established by consumers. Criteria used for collecting experience products are also developed. These criteria function as a *vignette* (Creswell 1998) that identifies the cases within a well-bounded scope of this adapted case study protocol.

Case study protocol	Sections of this paper
- Objectives	2. Research Approaches
- Defining Cases	2.1 Defining and Collecting Cases
- Collecting Cases	
- Pilot Analysis	2.2 Pilot Analysis
- Description and Analysis	2.3 Categorical Matrices
- Direct Interpretation	
- Categorical Aggregation	
- Patterns	3. The General Description of Experience Products
	4. Product Properties that Enable User Experience
	5. The Modalities of User Experience
- Triangulation	6. Further Studies

Table 1: Adapted case study protocol.

2. 1. DEFINING AND COLLECTING CASES

The criteria for selection of experience products are considered in both positive and negative ways. The positive criteria in regards to what experience products are and what they do: (1) products that enable users to involve in their product performance in an interesting way; (2) products that enable users either to absorb information or immerse themselves in thematic activities relative to product performance (Pine II and Gilmore 1999); (3) products that engage users who become spectators, participants, players, or even actors rather than merely manipulators or controllers; (4) products that provides users with sets, props, and/or costumes that stage users to experience; and (5) products that encourage users to engage visually, physically, and/or emotionally.

In contrast, the negative criteria in regards to what experience products are not and what they do not do: (1) most digital products with screens, programs, software or unlimited virtual world such as cell phones and music players; (2) products that rely on anthropomorphosis, mimicry, and/or bionics without enabling user experience; and (3) products that function as toys, games, and sports or competition equipment. Among these three criteria, the first one is applied because a virtual world can enable anything. For example, Wii® or PSP® enables users to play games. If all digital products are experience products, the scope of this research become too large to be researched. The second criterion is applied because the authors try to differentiate user experience from product aesthetics. Figure 1 shows some mimicry products that do not enable user experience. For example, the Pinocchio toilet brush looks great but it doesn't engage users to become spectators. If it assumes that product aesthetics enable visual experience, every good-looking product can be an experience product. The third criterion is applied because the raison d'être of toys, games, and sports or competition equipment is to engage players. If they are experience products, this research cannot tell how to turn a regular product into an experience product that engages users as players.



Door Stopper



Toilet Brush



Broom and Dustpan



Sugar and Salt Shaker

Figure 1: Mimicry products that do not enable user experience.





To collect the samples of experience products, the authors extensively searched online for approximately 50 websites and 200 products. The types of websites searched include firms and forums in product design, and retailers and museums offering peculiar products. At the time of writing, 31 samples including nine electric products and 22 non-electric products were found. Subsequently, a preliminary categorical matrix was established for sorting and scoring the 31 samples. In this way, similar samples and samples that might not enable quality user experience were eliminated. The final cases include 16 samples. They are different from each other and roughly match the categories in the matrix. The description of the categorical matrix is expanded in section 2.3.

2. 2. PILOT ANALYSIS

The authors bought 12 of the 16 experience products for analysis. The other four were replaced by high fidelity prototypes or similar products due to their unavailability in the market. The “9 O” clock and the “Pop Art ToasterTM” were chosen for the pilot analysis. These two products presumably allow the least and the most user-product interaction. The authors then attempted to use and/or interact with the 16 experience products. This approach is inspired from Jordan’s *immersion* and *appraisal* for product evaluation (2000). Based on this individual inspection and use, two data for each product were revealed: (1) a note that describes how each experience product is different from a regular product in appearance, use and function; and (2) a descriptive framework, *experience modeling*, which records the authors’ use and/or interaction with each experience product.

Table 2 shows the differences between experience products and regular products, taking the 9 O clock and the Pop Art ToasterTM as examples. The authors neglected trivial features such as color, material, texture, detailed shapes and accessories parts, all of which do little to enable user experience. The 9 O clock is different from a regular clock in appearance and function. It has nine sets of clock hands but no indication in seconds. The Pop Art ToasterTM is different from the regular toaster in appearance and use. It has eight accessory image plates and two slots inside the toaster for holding the plates. Users need to select two favorite image plates and insert them into the slots prior to toasting.

Figure 2 shows the experience modeling representing interaction with the 9 O clock. The whole interaction process is chronologically diagrammed from left to right. The left shaded columns, from top to bottom, include the modalities of user experience, the user’s actions and the product’s actions. The user’s actions are in the middle because it is convenient to align with the modal experience and the product’s actions caused by them. The user’s actions include user operation, objects and place. In this way, it is very easy to illustrate what a user does with the product. For example, the first two columns without shading stand for “the user installs batteries on the 9 O clock and then s/he hangs the clock onto the wall”. In addition, the product’s actions are constituted by two kinds of product operations. The first operation presents what the product does for its resulting artifact or function. The second operation presents what the elements and parts of the product do. For example, the first column without shading stands for “(the user installs batteries on the 9 O clock) so that it starts to instruct time by moving its clock hands”.

	Experience Products	Regular Products
Picture		
Appearance	<ul style="list-style-type: none"> • Nine sets of clock hands • No second hand 	<ul style="list-style-type: none"> • One set of clock hands • With second hand
Use Function	<ul style="list-style-type: none"> - • No indication in seconds 	<ul style="list-style-type: none"> - • With indication in seconds
Picture		
Appearance	<ul style="list-style-type: none"> • Accessory image plates* • Slots for image plates* 	<ul style="list-style-type: none"> • No accessory part
Use	<ul style="list-style-type: none"> • Select and insert image plates prior to toasting 	<ul style="list-style-type: none"> • No additional operation prior to toasting
Function	-	-

*Note: The accessory image plates and slots are not shown in the picture

Table 2: The differences between experience products and regular products.

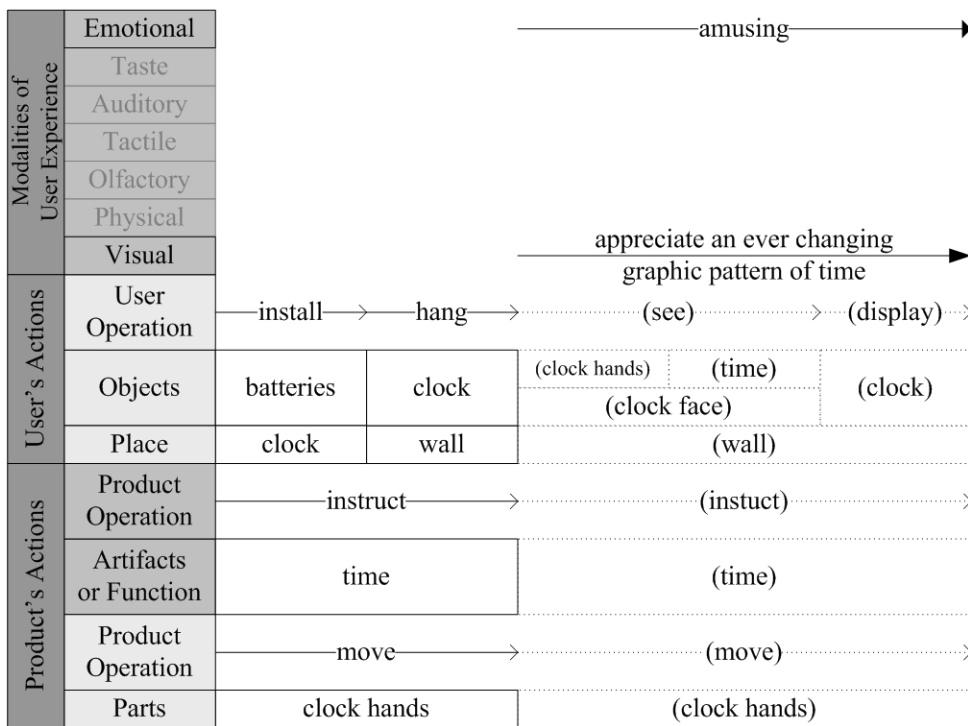


Figure 2: Experience modeling regarding the interaction with the 9 O clock.

The seven modalities of user experience include visual, physical, olfactory, tactile, auditory, taste and emotional modes. Therefore, various kinds of user experience can be illustrated along with a user's actions and a product's actions. In order to clearly tell when and how user experience occurs, three types of arrows indicate three different types of user-product interaction. Arrows without solid heads indicate normal user operation such as installing batteries, hanging the clock onto the wall, or checking the time. This type of interaction is what users usually do with regular products. In contrast, arrows with longer solid heads indicate particular user experience. For example, the 9 O clock enables bystanders to appreciate an ever-changing graphic pattern of time. This is a relatively more engaged experience in visual mode. To lie in between, arrows with shorter solid heads indicate so called *pleasures with products*: the emotional, hedonic and practical benefits associated with products (Jordan 1999). In addition, dotted lines indicate that the user interacts with the product without touching it. The shaded modal experience indicates that a particular modality does not occur during this user-product interaction. Using this descriptive framework, user experience can be differentiated from pleasures with products and normal operation.

To differentiate user experience from pleasures with products, the following rules and examples are established. User experience is defined as an engaged activity that a product attracts or inspires users to participate in. A product enables this kind of user experience by providing an analogy or metaphor relative to another interesting event or theme. Thus, the fulfillment of user experience is beyond that of better styling, usability and functionality. In contrast, pleasures with products are better satisfactions beyond users' expectations. A product enables pleasures by providing better styling, usability and/or functionality. In other words, pleasures with products are due to reliability, efficiency, effectiveness and/or visual aesthetics. For example, in figure 2, visual experience occurs because it is likely that anyone would appreciate the graphic pattern created by this amusing device of time. However, emotional experience doesn't occur because the ever-changing pattern only amuses users rather than evoking their memories relative to clocks. The user's mood only goes to a pleasurable level rather than an engaged level.

Figure 3 shows experience modeling regarding the interaction with the Pop Art Toaster™. This user-product interaction engages all kinds of experience modes. The interaction flow is longer and more complicated than that of the 9 O clock. Through iteratively establishing and modifying the experience modeling toward the 16 experience products, its applicability is corroborated. The experience modeling provides a simple way to record how a user experiences what a particular

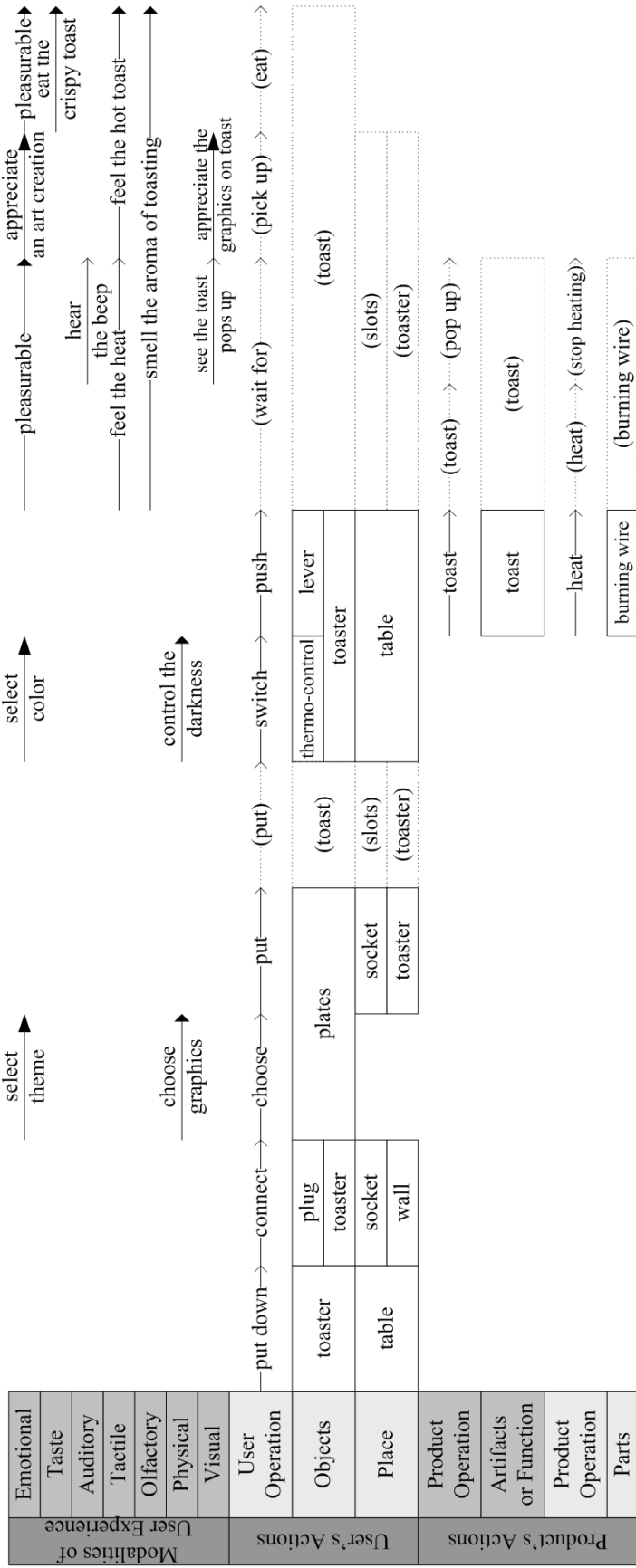


Figure 3: Experience modeling regarding the interaction with the Pop Art Toaster™.

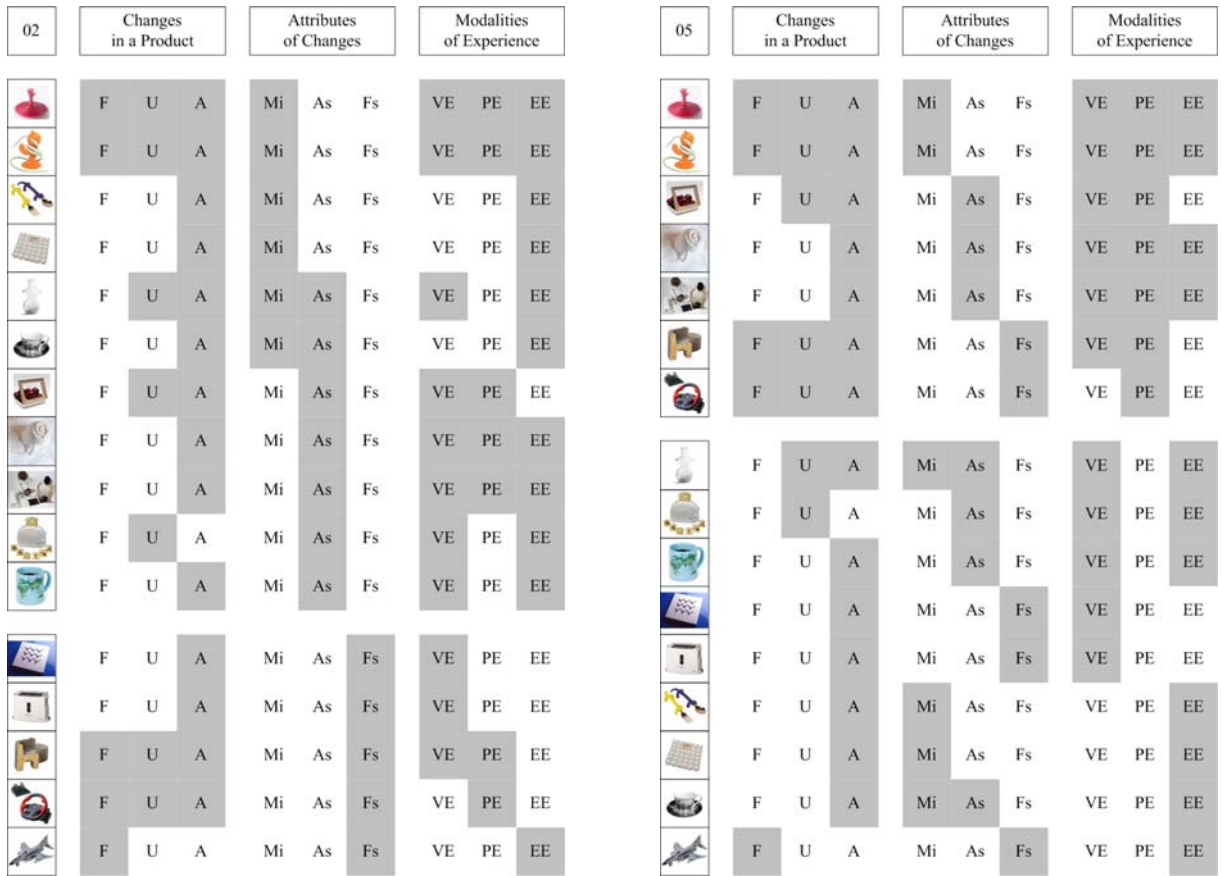
product stages. It helped the authors to heuristically analyze the 16 cases. Furthermore, it also supports to generalize the classification of user experience.

2. 3. CATEGORICAL MATRICES

In multiple-case study researches, *categorical aggregation* is a way to identify collection of instances from the data, seeking insights will emerge (Stake 1995, Creswell 1998). Due to the copious findings generated by close analysis of the 16 experience products (see 2.2), categorical matrices were created for analyzing their properties. Figure 4(a) shows one of the categorical matrices. The 16 experience products are illustrated in the first column on the left. Three sets of categories are listed in the first row at the top. They are “changes in a product”, “attributes of changes”, and “modalities of user experience”. Shading cells indicate the product possesses or provides that attribute. Six categorical matrices were generated by sorting the three categories in various ways. For example, figure 4(b) shows the categorical matrix sorted by physical experience.

Experience products are different from regular products because some aspects of them are changed. The boundary of changes is narrowed to three aspects: the appearance, the use, and the secondary function. For example, if a chair is redesigned so that several persons can sit down on it together, it is changed in its secondary function, holding multiple users. If users need to change their regular actions or process of use when using an experience product, or users need to learn how to use it over again, this product is changed in use. If an experience product is significantly redesigned in its appearance such as the 9 O clock with nine sets of clock hands, it is changed in appearance. The three aspects are not exclusive from each other. That is, changes in one experience product may include one or several aspects.

Attributes of changes regard the changes or “designed modifications” as a whole in relation to a product. According to the authors’ inspection, attributes of changes can be classified into three aspects: *mimicry*, *association* and *staging a function*. Mimicry means that the appearance of a product is designed to simulate a character, a creature or a circumstance, as shown in figure 1. Association means a product is designed to inspire users to associate with another interesting artifact, activity or circumstance. For example, the Pop Art Toaster™ associates toasting bread with creating pop art. Staging a function means a product is designed to turn its invisible mechanism into a compelling view, or to display its attractiveness such as what the 9 O clock displays. Although these three aspects are defined as exclusive from each other, two experience



(a) Sorted by "Attributes of Changes"

(b) Sorted by "Physical Experience"

Legend: "F" refers to changes in the secondary function of a product. "U" refers to changes in the use of a product. "A" refers to changes in the appearance of a product. "Mi" refers to mimicry. "As" refers to association. "Fs" refers to staging a function. "VE" refers to visual experience. "PE" refers to physical experience. "EE" refers to emotional experience.

Figure 4: Examples of two categorical matrices.

products are classified into both mimicry and association for more accurate description of their attributes.

The seven modalities that comprise a fundamental classification of user experience are reduced to the visual, physical and emotional modes. This category deals with how users receive and respond to experience products. *Visual experience* is similar to what tourists do in front of a magnificent view at the top of a skyscraper. It indicates that visitors do not comprehend the scenery through other senses when they see it in the distance. *Physical experience* is similar to

what a person likes to play if given a stick in hand. S/he can become a baseball batter, a conductor directing an orchestra, or even a Jedi Knight. With imagination and enjoyment, physical experience can be triggered by any kind of artifact such as an experience product. *Emotional experience* is what inspires a person from a meaningful artifact, or what s/he reflects upon when given a memory cue. It is important that emotional experience should relate to any property of the product. For example, the Pop Art Toaster™ makes users suppose they are artwork creators because browned areas on toast relates to pop art on canvas. In contrast, there is no relation between Pinocchio and the toilet brush in figure 1. That is why the toilet brush enables pleasurable visual *contact* rather than visual *experience*.

The categorical matrices illustrate the similarities and differences among the 16 experience products. This research presents findings that most cases shares and also highlights instances that are particular in only a few cases. That is, one cell in the categorical matrix is thoroughly considered if it is insightful for the development of experience products. Therefore, the quantification of how many experience products share a specific category is less important. The succeeding sections discuss other aspects including description, analysis and triangulation (Creswell 1998, Yin 2003) of the adapted case study protocol.

3. GENERAL DESCRIPTIONS OF THE EXPERIENCE PRODUCTS

This section describes the 16 experience products and compares them to their original or regular products that provide similar functions. This approach uses *direction interpretation* (Stake 1995, Creswell 1998) where the authors inspect each experience product and looks for its specific properties without cross-inspection of other experience products. It is an initial process of exploring useful data separately and putting them back together in more meaningful ways. Table 3 shows the general descriptions of the 16 experience products and the types of user experience they enable. The 16 regular products are also shown in table 3 for comparison. Due to the limit of this paper, only two experience products are fully described as examples in the following paragraphs.

Table 3(a) shows the “Help! Drain Stopper” produced by Propaganda® (See reference). It mimics a scene that a struggling hand is emerging from water and causing ripples. The vivid color also makes it more pleasurable than any regular drain stopper. Instead of a metal ring, its anthropomorphic hand allows users to pick it up as usual. However, because it is a one-size









Regular Products	Experience Products	General Descriptions and Discussion on User Experience
		<p>Descriptions:</p> <ul style="list-style-type: none"> • “Help! Drain Stopper” produced by Propaganda (See references). • It mimics a scene that a struggling hand is emerging from water and causing ripples. • The vivid color also makes it more pleasurable than any regular drain stopper. • Instead of a metal ring, its anthropomorphic hand allows users to pick it up as usual. • Because it is a one-size design, it probably cannot tightly stop water in a drain as much as a regular fitted drain stopper does. <p>User Experience:</p> <ul style="list-style-type: none"> • This product could enable visual, physical and emotional experience. • The user would have visual experience as seeing a poor character that is drowned when this product is used to stop water in a drain. • Physical experience takes place when the user turns on the faucet as if drowning the character, and when picking it up from the drain as if rescuing the character. • Emotional experience is evoked by playfully fooling with the character resulted from visual and physical experience.
		<p>Descriptions:</p> <ul style="list-style-type: none"> • “Mr. P One Man Tied” electric wire keeper produced by Propaganda (See references). • The disorderly wire bound all over the poor character stages an amusing phenomenon. • For keeping the character upright, there is a suction cup at the bottom for users to easily stick the wire keeper onto any smooth surface. <p>User Experience:</p> <ul style="list-style-type: none"> • This product could enable visual, physical and emotional experience. • The user would have physical and visual experience when s/he is imaginatively binding a poor character and seeing that it is bound. • A different physical experience takes place when the user releases the wire from the product as if releasing the poor character. • Emotional experience is how the user feels when playfully fooling with the character resulted from visual and physical experience.
		<p>Descriptions:</p> <ul style="list-style-type: none"> • “Dinnersaurs”, a fork and a spoon for kids, produced by Fred (See references). • The colorful silicone handle mimics dinosaurs that makes children’s table time more fun, just like the slogan printed on the package: “Invite a dino to dinner!” <p>User Experience:</p> <ul style="list-style-type: none"> • This product could enable kids to have emotional experience: eating like a dinosaur does or eating with dinosaurs. • “Dinnersaurs” could only enable emotional experience because it is a combination of tableware and toy dinosaurs whose intention is nothing else but to keep kids playing with it. That is, visual and physical modes of user experience are intended to happen.
		<p>Descriptions:</p> <ul style="list-style-type: none"> • “Life of The Snowman” sugar dispenser produced by Qibus (See references). • As this product has less and less sugar in it, it mimics the life of a snowman. • It also pushes users to keep refilling the sugar in order to keep the snowman from “melting”. • In contrast to any regular sugar dispenser, there is no lid on the top. This means that users have to load sugar through a hole at the bottom. <p>User Experience:</p> <ul style="list-style-type: none"> • This product could enable visual and emotional experience. • Visual experience takes place when the user regards this product containing less and less sugar as a melting snowman. • Emotional experience takes place when this product evokes the user’s reflection or memory of seeing, building or playing with a snowman.

Table 3: 16 selected experience products and 16 regular products.









Regular Products	Experience Products	General Descriptions and Discussion on User Experience
	 <p>(e)</p>	<p>Descriptions:</p> <ul style="list-style-type: none"> • A weight scale made by Viceversa (See references). • The standing area of this weight scale mimics an egg carton full of eggs. • It not only pushes users to worry about whether they are overweight but also amuses bystanders. <p>User Experience:</p> <ul style="list-style-type: none"> • This product enables only emotional experience: worrying about overweight. • It doesn't enable visual or physical experience because user-product interaction such as seeing eggs or stepping on eggs doesn't associate with the function or any property of the weight scale.
	 <p>(f)</p>	<p>Descriptions:</p> <ul style="list-style-type: none"> • “By The Lake”, a set of cup and saucer, produced by Chillichilly. • This product presents beautiful scenery by the lake with a woodland graphics on the cup and a layer of reflective plating texture on the saucer mimicking the surface of the lake. • The user can imagine s/he is drinking tea/coffee by the lake and enjoy the imaginatively relaxed time. <p>User Experience:</p> <ul style="list-style-type: none"> • This product enables only emotional experience: imaginative relaxation. • It doesn't enable visual experience because seeing the mimic scenery by the lake only goes to the pleasurable level rather than an engaged level that emotional experience requires.
	 <p>(g)</p>	<p>Descriptions:</p> <ul style="list-style-type: none"> • “Still Life Fruit Bowl” marketed by thorsten van elten (See references). • With this product, users can create their own masterpiece in either landscape or portrait form. • This design simply adds a picture frame that makes a normal fruit bowl amazingly artistic. <p>User Experience:</p> <ul style="list-style-type: none"> • This product could enable visual and physical experience. • Visual experience takes place when the user appreciates the still life behind the picture frame. • Physical experience takes place when the user puts fruits into the bowl as if composing a still life, and when the user takes away any fruit as changing the composition of the still life. • Interestingly, the user might like to more elegantly compose or change the pile of fruits.
	 <p>(h)</p>	<p>Descriptions:</p> <ul style="list-style-type: none"> • “Stamp Cup” produced by thorsten van elten (See references). • This product turns those irritating ring marks that regular cups leave into a nice floral pattern. • Not surprisingly, users might like to intentionally spill out some tea or coffee and use this “Stamp Cup” to create graceful floral patterns on their table. <p>User Experience:</p> <ul style="list-style-type: none"> • This product could enable visual, physical and emotional experience. • Visual experience takes place when the user appreciates the clear graceful floral pattern(s). • Physical experience takes place when the user, encouraged by the first clear graceful pattern, stamps more floral pattern(s). • Emotional experience takes place when the user regards this stamp process as making and appreciating graceful graphics.

Table 3 (Continued): 16 selected experience products and 16 regular products.









Regular Products	Experience Products	General Descriptions and Discussion on User Experience
	 (i)	<p>Descriptions:</p> <ul style="list-style-type: none"> • “Do Scratch Lamp” produced by droog (See references). • This product allows users to scratch anything they want onto the dark surface, and the white section will provide them light. • It gives a sense of personalization and is unique in its own right. • A user can carve a message to his or her sweetheart, or users can express themselves with their favorite phrase in light. <p>User Experience:</p> <ul style="list-style-type: none"> • This product could enable visual, physical and emotional experience. • Physical experience takes place when the user scratches the lamp surface to make it unique. • Visual experience takes place when the user appreciates the unique imprint lighted up. • Emotional experience takes place when the user recall memories the lighted imprint evokes.
	 (j)	<p>Descriptions:</p> <ul style="list-style-type: none"> • “Pop Art Toaster™”, produced by LC Premiums, Ltd (See references). • Users can brand fun images onto their toast with six interchangeable/ removable art plates. • This product makes toasting much more fun so that a routine breakfast becomes an interesting pop art occasion. <p>User Experience:</p> <ul style="list-style-type: none"> • This product could enable visual and emotional experience. • Visual experience takes place when the user appreciates the interesting branded graphics on toast. • Emotional experience takes place when the user regards this toasting process as an occasion of artwork creation. For example, switching the thermo-control is like controlling the darkness of the pigment, and seeing the well-baked toast is like appreciating an artwork.
	 (k)	<p>Descriptions:</p> <ul style="list-style-type: none"> • A Global Warming Mug marketed by The Unemployed Philosophers Guild (See references). • This mug is covered with the map of the world. • With hot beverage in the mug, the map shows disappearing land mass when the oceans rise 100 meters higher. • It is likely that users would stare at it for a while right after pouring a hot beverage in it. <p>User Experience:</p> <ul style="list-style-type: none"> • This product could enable visual and emotional experience. • Visual experience takes place when the user looks at the rising sea and inundated lands. • Emotional experience takes place when the user is reminded of global warming and environmental issues.
	 (l)	<p>Descriptions:</p> <ul style="list-style-type: none"> • “9 O” clock designed by FLEX/theINNOVATIONLAB. • This interesting clock is composed of nine clock movements that run simultaneously and create an ever-changing graphic pattern representing a poetic image of time. • The ordinary and prosaic user behavior of watching time is promoted as a pleasurable visual experience. • This case also points out how a clock, a product with which users never physically interact, encourages user experience. <p>User Experience:</p> <ul style="list-style-type: none"> • This product could only enable visual experience that takes place when the user regards the ever-moving clock hands as an amusing graceful pattern.

Table 3 (Continued): 16 selected experience products and 16 regular products.

Regular Products	Experience Products	General Descriptions and Discussion on User Experience
	 (m)	<p>Descriptions:</p> <ul style="list-style-type: none"> • A toaster produced by Sunbeam/Oster. • A viewing window on this toaster allows users to watch the burning wire and the bread. Therefore, rather than passively waiting for the toasting function to finish, users are able to visually engage in it. • This concept is totally the same with experience restaurants, in which customers can appreciate how a chef processes food (Pine II and Gilmore 1999, Gupta 1999). <p>User Experience:</p> <ul style="list-style-type: none"> • This product could only enable visual experience that takes place when the user watches the amusing toasting process through the small window.
	 (n)	<p>Descriptions:</p> <ul style="list-style-type: none"> • “FlexibleLove™” chair produced by Pinzaan Inc. (See reference). • This chair, produced from low-cost recycled paper and wood, incorporates an “accordion-like honeycomb” structure that is durable and collapsible. • This chair could hold from one to many persons depending on the length of the structure. • Users can easily change its length and shape with a simple pull at each end. In this way, it can be shaped as a love seat, long bench, couch or any other interesting or unusual chair. <p>User Experience:</p> <ul style="list-style-type: none"> • This product could enable visual and physical experience that take place when the user creates a unique chair, appreciates it and sits on it. • A more interesting visual and physical experience is that the user is trying to shape several different forms; then, however, sitting down becomes less important.
	 (o)	<p>Descriptions:</p> <ul style="list-style-type: none"> • A steering wheel and gas and brake pedals produced by Logitech. • Compared to a traditional joystick, this product makes the high-speed racing game more real and fun. • Force feedback is the new function and lets users feel the road, bumps, walls, and crashes. <p>User Experience:</p> <ul style="list-style-type: none"> • This product enables an ultimate physical experience: driving.
	 (p)	<p>Descriptions:</p> <ul style="list-style-type: none"> • A toy airplane with sound effects. (Because sound effects are not tangible, two identical pictures of the toy airplane represent both regular and experience products.) • This toy airplane sounds like it is ascending or diving when the child holds it upward or downward respectively. It satisfies the child who likes to hold it aloft. <p>User Experience:</p> <ul style="list-style-type: none"> • This toy airplane provides additional sensory stimulation that could enable the child’s emotional experience: imaginatively being a pilot.

Table 3 (Continued): 16 selected experience products and 16 regular products.

design, it probably cannot tightly stop water in a drain as much as a regular fitted drain stopper does. According to the authors' own appraisal, this product could enable visual, physical and emotional experience. For example, the user would have visual experience as seeing a poor character that is drowned when this product is used to stop water in a drain. Physical experience takes place when the user turns on the faucet as if drowning the character, and when picking it up from the drain as if rescuing the character. Emotional experience is evoked by playfully fooling with the character resulted from visual and physical experience.

Table 3(g) shows the "Still Life Fruit Bowl" marketed by thorsten van elten (See reference). With this product, users can create their own masterpiece in either landscape or portrait form. This design simply adds a picture frame that makes a normal fruit bowl amazingly artistic. This product could enable visual and physical experience. Visual experience takes place when the user appreciates the still life behind the picture frame. Physical experience takes place when the user puts fruits into the bowl as if composing a still life, and when the user takes away any fruit as if changing the composition of the still life. Interestingly, the user might like to more elegantly compose or change the pile of fruits.

Parenthetically, table 3(o), a steering wheel and pedals, and (p), a toy airplane, belong to toys. They remain in the set because these two cases demonstrate how toy products more intensively enable user experience in two different ways.

4. PRODUCT PROPERTIES THAT ENABLE USER EXPERIENCE

The experience modeling and categorical matrices help to point out some meaningful *patterns* (Stake 1995, Creswell 1998) that distinguish the 16 experience products. The intention of this section is to interpret these patterns that indicate corresponding product properties enable user experience. Aspects of the patterns include: (1) the changes in appearance, use and/or function required for designing experience products; and (2) those attributes that the experience products embody in comparison to the usual ones.

4. 1. CHANGES IN THE EXPERIENCE PRODUCTS

Among the 16 experience products, 14 products are changed in appearance, eight products are changed in use, and five products are changed in secondary function. It is rational to determine

that, for designing experience products, change in appearance is more significant than changes in use and change in use is more significant than changes in secondary function. It indicates that change in appearance may be an easy but influential means to design for user experience.

Another important finding is that even one simple change can successfully result in experience products. For example, the egg scale is just a regular scale cased in a mimic egg carton full of eggs. The Pop Art Toaster™ is not different from other toasters in appearance and function. It is only changed in use that is associated with the creation of pop art. The toy airplane is changed in the sound effects that belong to a single designed modification in its secondary function. These three cases demonstrate that user experience could be successfully enabled by a change in either appearance, use or a secondary function without disturbing the other aspects. In other words, designers can easily design experience products if products are upgraded with wonderful styling, more friendly usability and/or better functionality.

With regards to combinations of changes, among the 16 experience products, the following were observed: four products are changed in appearance, use and secondary function; three products are changed in both appearance and use; seven products are changed only in appearance; one product is changed only in use and one only in secondary function. The combinations of changes aforementioned result in experience products. But what about the remaining two combinations that do not show up? The fact is that changes in both appearance and secondary function, and changes in both use and secondary function could also result in experience products because we see that the toy airplane, changed only in its secondary function, is an experience product.

For example, presume that another toy airplane is a Transformer with dynamic sound effects. Three different kinds of sound effects can be activated when it is moved up and down, and when it is transformed. Compared to the toy airplane in table 3, this Transformer has changed not only in its secondary function but also in its appearance. And more importantly, it makes children more engaged than the toy airplane does due to the additional transforming sound effects. Similarly, there could be another toy airplane with engine and machine gun sound effects. The machine gun sound effects can be activated when it is aimed at toy enemy troopers or targets. Accordingly, this toy airplane has changed in its use and secondary function. And it also engages children more than the toy airplane does because children get simulated targets to destroy. Therefore, more involved user-product interaction such as upgrading from piloting an air fighter to carrying out a mission can deepen user experience. These two imagined examples prove more possibilities in designing experience products.

4. 2. MIMICRY, ASSOCIATION AND STAGING A FUNCTION

Among the 16 experience products, six products rely on mimicry, seven products rely on association, and five products rely on staging function. Interestingly, two products rely on both mimicry and association. The graphics and texture on “By the Lake” cup and saucer set mimic the scenery by the lake. This product is designed to resonate with a poetic and relaxed moment. Similarly, the glass bottle of the sugar dispenser mimics the contours of a snowman where snow is replaced by sugar.

Mimicry is often applied to static products such as hardware and tableware that provide very simple function, unlike electric and digital products. Mimicry is achieved through changes in appearance and usually results in both playful interaction and amusing visual contact. However, another pattern shows that mimicry often results in emotional experience rather than visual or physical one. This is because mimicry not only encourages visual and physical interaction but also lets users imagine they are doing something else of interest. For example, when one winds wire onto the Mr. P One Man Tied electric wire keeper, s/he is imaginatively binding the poor character. This makes the user operation much more fun.

Association can be applied to products ranging from tableware to electric appliances. According to the categorical matrix, association results in various combinations of modal experience including visual mode. For example, the Global Warming Mug enables visual and emotional experience, whereas the Do Scratch Lamp enables a triple modal experience. It indicates that association is a good way to redesign a regular product without any designated kind of user experience. However, designers need to know that association does not result from any change in the primary function of a product because it is the function that inspires association with thematic user experience. For example, the function of the Stamp Cup is to serve coffee or tea that is the ink for stamping graceful floral patterns. The cup’s function is not changed at all.

Staging function can be applied to different kinds of products including chairs, electric appliances and toys only if these products’ functions are attractive or interesting enough to enable visual contact. For example, the toaster with a viewing window stages its toasting function for users to watch. The steering wheel and pedals for playing racing game stages a more real cockpit that users can physically engage in. In addition, staging a function usually results in either visual, physical or emotional experience. This indicates that staging a function, which only enhances a single mode of stimulation, is a less interesting way to promote users’ engagement. On the other

hand, a function staged is attractive because it is observed on occasion rather than intensely for its spectacle. Therefore, a staged function is usually a simple scene rather than a sequence or animation full of meaningful information. It usually enables simple contact such as watching or playing rather than multi-modal interaction. As a result, staging a function usually enables visual experience rather than physical or emotional experience.

5. THE MODALITIES OF USER EXPERIENCE

This section discusses the visual, physical and emotional experiences that the 16 experience products enable. Patterns in the categorical matrix show that any rich experience fulfilling these three modes results from mimicry or association. This is reasonable to conclude because user experience with multiple modalities comes from more complicated user-product interaction. And this deep interaction cannot be enabled only through staging a function of a product. This finding confirms the interpretation in 4.2 that staging a function usually results in single visual experience rather than a triple modal experience.

In terms of the three different modalities, visual experience absolutely requires changes in product appearance relative to either mimicry, association or staging a function. That is, any of these three attributes can enable visual experience. Additionally, visual experience correlates with emotional experience only if the visual contact is meaningful enough to evoke spectators' memory. For example, the Do Scratch Lamp allows users to make signs or marks to display their creativity or personality on it. These unique signs enable not only visual experience but also emotional experience when the signs that are lighted up become a memory cue.

Physical experience results from either mimicry, association or staging a function. It usually takes place with visual experience. For example, in the case of the Help! Drain Stopper, physical experience such as drowning the poor character makes the activity of washing amusing. It also enables visual experience: the user momentarily and imaginatively stares at the drowning scene. In the case of the Still Life Fruit Bowl, physical experience such as composing the still life enables visual experience. Users are more likely to watch the pile of fruit through the picture frame because it is really very interesting to do so. Indeed, physical experience usually leads to an appealing creation or phenomenon that attracts users' vision.

Emotional experience usually results from mimicry and/or association. There are nine experience products relying on either mimicry or association such as the Life of the Snowman and By the

Lake. However, as mentioned in 4.1, staging a function can still enable emotional experience in specific cases such as the toy airplane with sound effects. Another important finding is that emotional experience doesn't take place in combination with physical experience in this research. It indicates that physical experience on its own does not help to enable emotional experience. Or perhaps visual experience helps to enable emotional experience more effectively than physical experience does.

6. CONCLUSION AND DISCUSSION

This research created a case study protocol to analyze 16 experience products. These 16 products possess particular properties that enable various types of user experience. To conclude, product properties are identified and sorted into two categories: changes in a product and attributes of changes. Changes in a product include changes in appearance, use and function, respectively. Attributes of changes include mimicry, association and staging a function. These six types of product properties can facilitate product design that results in experience products. From the user's perspective, experience can be classified into visual, physical and emotional experience. Therefore, it is rational to regard the relationships between the product properties and the modal experience as having causal relationships that are evident in user experience. This paper has provided a detailed discussion of these relationships that are summarized in table 4 below. This achievement is fundamental and valuable for developing more rigorous approaches for enabling user experience in product design.

However, this paper only presents a preliminary analysis of experience products. In the next phase of the research, the categorical matrix needs to be expanded so that more patterns can be identified. For example, Pine II and Gilmore (1999) proposed *the experience realms*, in which four types of consumer experience are defined, including *entertainment*, *education*, *aesthetics* and *escapist*. Considering alternative categories in the categorical matrix, the authors believe that more insightful patterns of both experience products and user experience will emerge.

Furthermore, to confirm the validity of this study, the findings based on the first author's individual analysis toward the 16 experience products needs to be rigorously verified. To carry out this triangulation, the authors plans to applied well-structured interviews to compare the identified patterns with participants' appraisal after they immerse themselves in the same user-product interaction as the authors has conducted. Only by doing so can convincing approaches for enabling user experience in product design be developed.

Changes in Product

- Importance: Change in appearance > Change in use > Change in secondary functions
- Change in appearance, use or secondary function → experience products
- Change in function × Association

Attributes of Changes

- Mimicry applied to hardware and tableware
- Change in appearance → Mimicry
- Mimicry → Playful and visual contact
- Mimicry → Emotional experience
- Mimicry → Triple modal experience

- Association applied to tableware ~ electric appliances
- Association → Various single and multiple modal experience
- Association → Visual experience

- Staging a function applied to chairs, electric appliances and toys
- Staging a function → Single modal experience
- Staging a function → Visual experience > Physical experience > Emotional experience

Attributes of Changes

- Mimicry, association, or staging a function → Physical experience
- Physical experience → Visual experience
- Mimicry, association, or staging a function → Visual experience
- Mimicry, association → Emotional experience
- Staging a toyish function → Emotional experience
- Visual experience → Emotional experience
- Physical experience × Emotional experience

Legend: ">" means more than; "→" means result in; "X" means seldom result in.

Table 4: The relationships between the product properties and the modal experience.

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