

Surprise As a Design Strategy

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Introduction

Imagine yourself in a line waiting for a checkout in a supermarket. Naturally, you picked the wrong line, the one that doesn't seem to be moving. You get tired of waiting. How would you feel if the cashier suddenly started to sing? Many of us would be surprised and, regardless of the cashier's singing abilities, feel amused. This is a good example of how a surprise can transform something very normal and maybe even boring into a pleasant experience. Analogously, a surprise in a product can overcome the habituation effect caused by people encountering many, similar products every day. Colin Martindale describes this effect as "the gradual loss of interest in repeated stimuli."¹

A surprise reaction to a product can be beneficial to both a designer and a user. The designer benefits from a surprise reaction because it can draw attention to the product, leading to increased product recall and recognition, and increased word-of-mouth.² Or, as Jennifer Hudson puts it, the surprise element "elevates a piece beyond the banal."³ A surprise reaction has its origin in encountering an unexpected event. The product user benefits from the surprise because it makes the product more interesting to interact with. In addition, it requires updating, extending, or revising the knowledge the expectation was based on. This implies that a user can learn something new about a product or some aspect of a product.

Designers already use various strategies to design surprises in their products. Making use of contrast, mixing design styles or functions, using new materials and/or new shapes, and using humor are just a few. The lamp "Porca Miseria!" designed by Ingo Maurer shown in the left part of Figure 1 consists of broken pieces of expensive porcelain tableware, making it a lamp with a unique shape. The idea that another product had to be destroyed to make this lamp may elicit feelings of puzzlement and amusement from someone who sees this lamp. The perfume "Flowerbomb" (right part of Figure 1), designed by fashion designers Victor & Rolf, is another example. The bottle is shaped like a hand grenade, and it holds a sweet-smelling, soft-pink liquid. By combining conflicting elements in a perfume bottle, Victor & Rolf have succeeded in creating a perfume that attracts attention amid the dozens of perfumes that line the walls of perfumeries.

1 Colin Martindale, *The Clockwork Muse: The Predictability of Artistic Change* (New York: BasicBooks, 1990).

2 Christian Derbaix and Joëlle Vanhamme, "Inducing Word-of-Mouth by Eliciting Surprise—A Pilot Investigation," *Journal of Economic Psychology* 24:1 (2003): 99–116; and Adam Lindgreen and Joëlle Vanhamme, "To Surprise or Not Surprise Your Customers: The Use of Surprise As a Marketing Tool," *Journal of Customer Behavior* (2003): 219–242.

3 Tom Dixon and Jennifer Hudson, *The International Design Yearbook 19* (London: Laurence King, 2004).

Figure 1

Lamp "Porca Miseria!" designed by Ingo Maurer. Photo: Tom Vack. Courtesy of designer. Perfume "Flowerbomb" designed by Viktor & Rolf. Photo by Geke Ludden.



Figure 2

Logo of Kia with payoff: "The power to surprise." Courtesy of Kia. Advertisement of Swatch with claim "Always surprising." Courtesy of Swatch.



4 Jasper Morrison, Michael Horsham, and Jennifer Hudson, *The International Design Yearbook 14* (London: Laurence King, 1999); Ingo Maurer and Susan Andrew, *The International Design Yearbook 15* (New York: Abbeville, 2000); Michele de Lucchi and Jennifer Hudson, *The International Design Yearbook 16* (New York: Abbeville, 2001); Ross Lovegrove and Jennifer Hudson, *The International Design Yearbook 17* (Amsterdam: BIS, 2002); and Karim Rashid, *The International Design Yearbook 18* (London: Laurence King, 2003).

Surprise also is used in product marketing as a positive quality of products or brands. Kia Motors Corporation, a South Korean car manufacturer, even uses surprise as the brand's major payoff: "Kia, the power to surprise." Furthermore, Swatch, the famous Swiss watch manufacturer, claims that their brand is "always surprising."

This paper will outline the use of surprise in contemporary design. Based on an analysis of a set of surprising products and on discussions with the designers of some of these products, we will give insight into how and why designers create surprising products, and the effects of creating surprises. We noticed that designers often make use of visual-tactual incongruities to create surprising products. For example, an analysis of designs in five issues of *The International Design Yearbooks* (IDY 1999–2003)⁴ showed that one to six percent of these designs incorporate some form of visual-tactual incongruity. Therefore, we decided to focus our discussion of surprise in product design on this type of products.

Visual-Tactual Incongruities and Surprise

Visual-tactual incongruities occur when people perceive incongruent information through vision and touch. Some object properties can be experienced through both vision and touch. People can, for example, both see and feel a texture or a shape. However, the information the two modalities provide is not always the same. Sometimes, you feel something different from what you (thought you) saw. If you feel something unexpected, you will be surprised.

We studied one-hundred-and-one products with visual-tactual incongruities (sixty-three found in the IDYs, and thirty-eight found at design fairs, on the Internet, and in shops), and distinguished two types of surprising products that have different mechanisms underlying the surprise reaction. We defined these two types of surprising products as “Visible Novelty” (VN) and “Hidden Novelty” (HN). The distinction between the two surprise types is based on the initial sensory expectations the potential user forms.

Expectations can be based on different sources of information. Oliver and Winer⁵ mention three sources for expectations as conceptualized by Tolman: “memories of actual experiences, perceptions of current stimuli, and inferences drawn from related experiences such as [the] trial of other objects.”⁶ With respect to expectations about how a product will feel, taste, smell, or sound, this implies that a person’s visual impression of a product, his/her previous experiences with that product, or experiences with similar products can be the basis for the expectation.

An expectation involves uncertainty,⁷ the degree of which depends on the source of the expectation. When the expectation is based on a memory of an actual experience, the level of uncertainty is likely to be lower than when it is based on inferences drawn from related experiences. In the latter case, the perceiver cannot be sure that the current experience is fully comparable to the related experiences, and thus will be more uncertain about what to expect.

The sources for expectations and their uncertainty differ between the two surprise types. The VN surprise type consists of products that seem unfamiliar to the perceiver. Consequently, the perceiver is not able to form an expectation based on previous experiences with the product. The perceiver forms an expectation about how the product will feel based on resemblances to other products in, for example, shape or material. A high degree of uncertainty will accompany this expectation. A surprise is experienced whenever the uncertain expectation is disconfirmed. A VN product can, for example, be made out of a new material that the perceiver vaguely associates with a material he/she knows. An expectation then could be based on experiences with the known material, but the new material can have very different tactual properties.

The HN surprise type includes products that seem familiar to the perceiver, but have unexpected tactual properties. In this case, the expectation about how the product feels is based on previous

5 Richard L. Oliver and Russell S. Winer, “A Framework for the Formation and Structure of Consumer Expectations—Review and Propositions,” *Journal of Economic Psychology* 8:4 (1987): 469–499.

6 Edward C. Tolman, *Purposive Behavior in Animals and Men* (New York: Appleton-Century-Crofts, 1932).

7 Richard L. Oliver and Russell S. Winer, “A Framework for the Formation and Structure of Consumer Expectations—Review and Propositions.”

experiences with a similar product. The perceiver is quite certain about his/her expectation. A surprise is elicited, because the apparent familiarity is evidently proven wrong by touching the product, disconfirming the expectation: the visual perception is misleading or the product has hidden characteristics that prohibit the perceiver from forming a correct expectation. An example of a HN product is a plastic bowl that looks like a crystal bowl. Upon seeing this product, the perceiver thinks that the product will be heavy. When the product is touched and lifted, however, the perceiver is surprised about the much lower weight of the bowl.

Design Strategies

Designers seem to create products in the HN and VN types by making use of several different design strategies. We identified six different design strategies (DS): “new material with unknown characteristics”; “new material that looks like familiar material”; “new appearance for known product or material”; “combination with transparent material”; “hidden material characteristics”; and “visual illusion.”

In all six strategies, a combination of two opposites is used: something new is used (“newness”), and a reference to something familiar is made (“familiarity”). The combination of new and familiar elements is likely to result in surprise. The familiar element of the product forms the basis for an expectation about its other elements. Subsequently, the new element will disconfirm this expectation. New and/or familiar elements can be used in the visual domain in the appearance of the product (e.g., in shape, material, or type of product), and/or in the tactual domain in the material properties of the product (e.g., in weight, flexibility, or balance).

The newness of a product is likely to be relative. According to Daniel Berlyne, it is highly unlikely that an adult encounters an absolutely novel stimulus, a stimulus unlike anything that individual has experienced before.⁸ Probably, what someone perceives as new will consist of previously experienced elements in a different combination, or will resemble familiar stimuli. This is what Berlyne describes as “relative novelty.” Paul Hekkert et al. found that people prefer products with an optimal combination of typicality and novelty.⁹ Their findings are consistent with the design principle called “MAYA” (Most Advanced, Yet Acceptable) by designer Raymond Loewy.¹⁰ Analogously, people will prefer products that have a combination of both familiar (i.e., typical) and new (i.e., novel) elements.

The next sections discuss how these two elements are present in each design strategy. In addition, we will present examples of products that could have been designed by following that strategy. The design strategies can result in the two different types of surprising products discussed. Four strategies can lead to a product in the VN type. One of these strategies also can lead to a product in the HN type, and the two other strategies can only lead to a product in the

8 Daniel E. Berlyne, *Aesthetics and Psychobiology* (New York: Appleton-Century-Crofts, 1971).

9 Paul Hekkert, Dirk Snelders, and Piet C. W. van Wieringen, “Most Advanced, Yet Acceptable: Typicality and Novelty as Joint Predictors of Aesthetics Preference in Industrial Design,” *British Journal of Psychology* 94 (2003): 111–124.

10 Raymond Loewy, *Never Leave Well Enough Alone* (New York: Simon and Schuster, 1951).

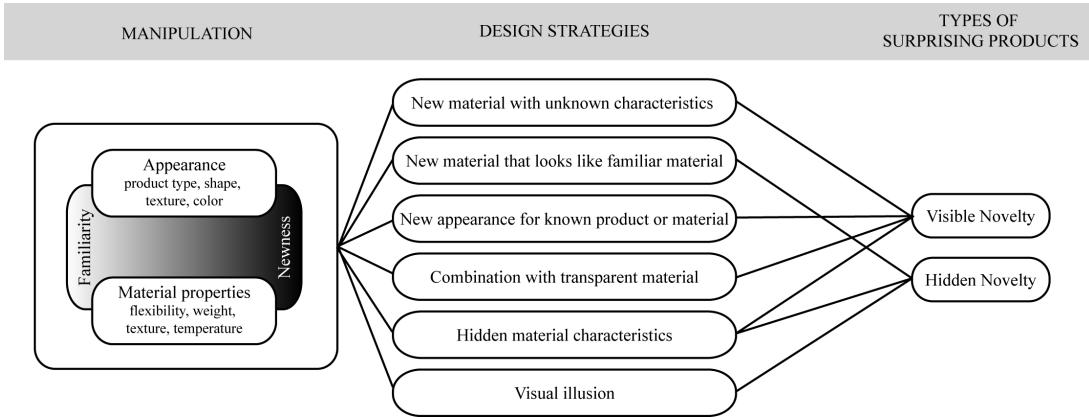


Figure 3
Relationships between design strategies, their underlying dimensions, and resulting types of surprising products.

HN type. Figure 3 illustrates the relationship between the six design strategies, newness and familiarity, and the two types of surprising products.

Design Strategies 1 and 2: New Materials

New materials are likely to have new and unknown characteristics that can lead to new visual and/or tactual experiences. According to Ezio Manzini, more and more surprising products have appeared on the market due to a “loss of recognition” since the introduction of plastics.¹¹ Many new plastic materials possess unknown material characteristics. Upon seeing these materials, people experience uncertainty about their feel characteristics because they do not know them. Upon touching the materials, they might be surprised by their feel. For example, the much lighter weight of many plastics, combined with their strength relative to previously known materials such as steel and wood, surprised many people when plastics were first introduced.

The development of smart(er) materials also offer wide opportunities for designers to explore new sensory experiences.¹² An example of the use of a smart material is a water kettle made out of a thermochromic material that changes color when its temperature rises. Thus the kettle visually “warns” the user when it is hot. Several companies and institutes; such as Material Connexion, Materia, and Innovathèque; assist designers in their search for new and innovative materials.

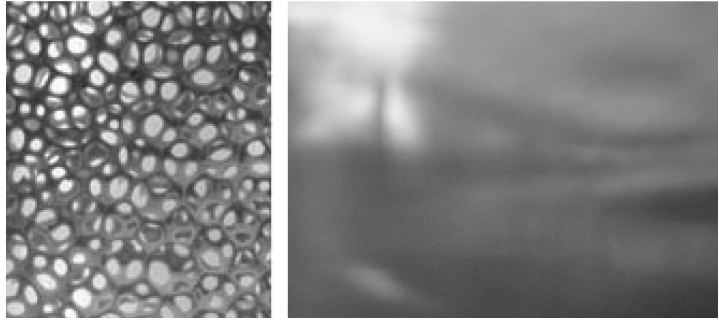
When observing a new material, a perceiver will form a feel expectation based on its resemblance to familiar materials. If the new material looks exactly like a known material, these expectations can be certain. If not, they will be uncertain. These two cases yield very different design approaches and therefore are discussed as two separate design strategies.

11 Ezio Manzini, *The Material of Invention* (London: Design Council, 1989).

12 Marion Verbücken, “Towards a New Sensoriality” in *The New Everyday: Views on Ambient Intelligence*, Emiel Aarts and Stefano Marzano, eds. (Rotterdam: 010 Publishers, 2003).

Figure 4

Examples of products corresponding to DS1, new material with unknown characteristics. Foam for Prada, designed by OMA. Polyamide/viscose cloth, designer unknown. Photo by Geke Ludden.



Design Strategy 1: New Material with Unknown Characteristics

The foam developed for Prada depicted on the left in Figure 4 is a structure with large holes, which make it look like it is flexible. However, when seen in a large construction, it also resembles hard plastic because it seems to hold a certain weight. Someone who sees this foam may not be certain about how it feels. The same holds for the cloth depicted on the right in Figure 4: it looks like flexible plastic, but it reflects light slightly differently, leading to an uncertain expectation. In reality, the cloth has feel characteristics different from plastic: it feels soft, very similar to silk. A new material with unknown characteristics will lead to a product in the VN type, because someone who sees the material is uncertain about how it will feel.

Design Strategy 2: New Material That Looks Like Familiar Material

If someone sees a new material and nevertheless is certain about how it will feel, he or she can be surprised upon touching the product. Apparently, he or she had incorrectly identified the new material as a familiar material, and is surprised that this material feels different. Designers often deliberately use this effect when they create a generally well-known product out of another material. This design strategy always leads to products in the HN type. After all, for a

Figure 5

Examples of products corresponding to DS2, a new material that looks like a familiar material. Polycarbonate vase, designer unknown. Photo by Geke Ludden. Lamp "Flexlamp," designed by Sam Hecht. Courtesy of designer.



surprise to occur, the product must look exactly like a familiar product. Examples of products that employ this strategy can be found in Figure 5.

The vase on the left looks like a crystal vase. Its shape and the decorations on the surface are very similar to those used for traditional crystal vases. However, this vase is made out of plastic, which results in entirely different feel characteristics: this vase is much lighter than the crystal vase it resembles. The lamp on the right looks like it is made out of matt glass. Again, it resembles typical glass lamps in shape and surface texture. This lamp is actually made out of flexible polyurethane rubber, and it feels much more flexible than a lamp made out of glass.

Design Strategy 3: New Appearance for Known Product or Material

Using a new appearance for a familiar product or material can lead to an uncertain, incorrect feel expectation. If the new appearance resembles another well-known product or material, a designer creates a deliberate reference to a familiar thing. Since the new appearance is immediately visible, this leads to an uncertain feel expectation, and thus to a VN-type product.

The tiles on the left in Figure 6 are made out of ceramics like most tiles. However, using a new shape (resembling the shape of a softer material) for this product results in the uncertain expectation that these tiles may feel soft. The tiles actually feel hard, like other ceramic tiles.

Alternative or new production techniques also can be used to create new shapes for known materials. The lamp on the right in Figure 6 is made using a 3D printing technique, creating a new shape for a lamp and for the material, a polyamide. The lamp looks like it is made out of cloth or paper, and may be expected to feel light and flexible. However, it feels solid, heavy, and unflexible.

Figure 6

Examples of products corresponding to DS3, new shape or product for known material. Tiles "Tactiles," designed by Baukje Trenning. Courtesy of Koninklijke Tichelaar Makkum. Lamp "Konko," designed by Willeke Evenhuis and Alex Gabriel. Courtesy of designers.



Figure 7

Examples of products corresponding to DS4, new combination of materials. Tables "Apple," designed by Ilaria Marelli. Courtesy of designer. Natural Acrylic, designed by Pyrasied Xtreme Acrylic. Courtesy of designer.



Design Strategy 4: Combination with Transparent Material

A new combination of a familiar material with a transparent (also familiar) material can produce conflicting information about feel characteristics, leading to an uncertain feel expectation. A combination with a transparent material therefore can lead to a product in the VN type.

The benches on the left in Figure 7 are made of a combination of soft foamy cushions and a hard plastic cover. The cushions are associated with softness, leading to the expectation that the cover is soft, too, and that the cushions will be felt when sitting down. However, the hard cover makes the bank feel completely rigid.

The natural acrylics range of Pyrasied Xtreme Acrylic¹³ is another example of a new combination of materials. In this range of acrylics, natural materials are combined with transparent plastic (see picture on the right in Figure 7). Someone seeing this material may not be sure whether or not the natural material, in this case bamboo, can be felt. In reality, only a smooth plastic surface is felt.

Design Strategy 5: Hidden Material Characteristics

Some of the materials used in a product may be hidden. By hiding these materials, relevant feel characteristics cannot be observed. The feel expectation is based only on the visible materials, thus leading to an incorrect feel expectation. This expectation can be either uncertain or certain, depending on how familiar the product looks. Consequently, this strategy can lead to either a product in the VN type (see first example) or in the HN type (see second example).

The chair on the left in Figure 8 looks like it is made out of paper, which is uncommon for a chair. This appearance may lead to the uncertain expectation that this chair is very light. However, beneath the paper there is wood, a much heavier and more rigid material.

13 Els Zijlstra, *Material Skills, Evolution of Materials* (Rotterdam: Materia, 2005).

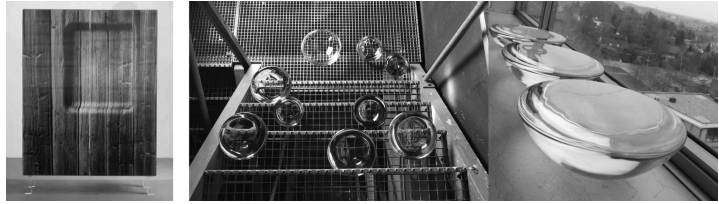
Figure 8

Examples of products corresponding to DS5, hidden material characteristics. Chair "Bastian," designed by Robert Wettstein. Courtesy of designer. Bench from Bisazza's "Soft Mosaic Collection," designed by Jürgen Mayer. Courtesy of Bisazza.



Figure 9

Examples of products corresponding to DS6, visual illusion. Cupboard "Yourside," designed by Markus Benesch (Money for Milan). Courtesy of designer. Bowls "Solid, solid+liquid and liquid," designed by Monique Borsboom. Courtesy of designer.



The bench on the right in Figure 8 is from Bisazza's "Soft Mosaic Collection." The bench looks like it is made out of glass tiles. Someone who sees this bench probably will be certain that it feels hard and rigid. However, beneath the small tiles is a soft foam-type underlay. The bench, therefore, yields when sat upon.

Design Strategy 6: Visual Illusion

Visual illusions can be used to form a misleading appearance. Artists have used visual illusions such as *trompe l'oeils* for a long time. Applied in product design, similar techniques can lead to certain, but false feel expectations.

The cupboard on the left in Figure 9 has a printed laminate that makes it look like there is a cove in the cupboard, which actually doesn't exist. The glass bowls on the right in Figure 9; called "Solid, solid+liquid and liquid"; look like they all are hollow shapes when viewed from above. However, some of the bowls actually have an almost flat upper surface.

It must be noted that a visual illusion often is solvable by using vision only, usually by changing viewing position. However, when a visual illusion is solved by touching the product, a visual-tactual incongruity is perceived.

Surprise as a Design Strategy?

Considering the frequent use of visual-tactual incongruities in product design and the variety of strategies that designers use to create them, one might conclude that designers think of creating surprises as an effective strategy to create interesting and original products. However, from discussions with designers, some of whom designed products we used to illustrate the design strategies, we learned that this not always was the case. The surprises they had created sometimes were only the by-product of other aims, such as searching for new experience, using new materials or techniques, or creating conflict within a product. This illustrates that designers not always were aware that they were creating surprises.

We would like to stress how important understanding the mechanism of surprise and being aware of the impact of a surprising product is to designers. After all, if designers understand how a surprise is created, they will be able both to avoid surprise when they do not want it, and to effectively use surprises in other situations. This is significant because using surprise as a strategy to create interesting and original products may not always produce the



Figure 10
Bench "Shrunken Furniture," designed by
Bertjan Pot. Photo by Geke Ludden.

desired effect. Although most designers who use surprise think that people appreciate the surprises their products evoke, by its nature, using surprise can be dangerous, too. Besides evoking pleasant and/or new experiences, unexpected events also can lead to disappointment, and users may even feel misled or fooled upon experiencing a surprise. In addition, some designers remarked that they were disappointed because the surprise seemed to distract potential users from another message they wanted the product to communicate. Furthermore, although discovering a surprise in a product initially may be a pleasant experience, the effect of this surprise may be negligible or even unpleasant in the long term.

So far, our knowledge about people's reactions (both on the short and the long term) to surprising products is limited. In general, in market research studies, surprise was found to be positively related to satisfaction with the product.¹⁴ More specifically, our research on surprising products suggests differences in people's reactions to VN and HN products.¹⁵ People tended to exhibit more exploratory behaviours when interacting with VN products; possibly because they enjoyed exploring these products, or because they wanted to discover the exact material properties of these products. It is possible that they needed more time in order to understand the origins of their surprise reaction. On the other hand, for HN products, it seems that the experienced surprise upon touching the product is immediately understood, and further exploration or cognitive effort is unnecessary. This may partly explain why people often viewed VN products as more interesting than HN products.

Apparently, using different design strategies can lead to surprises that are appreciated differently. It should be noted that it also is possible to use a combination of design strategies in one product. For example, the bench in Figure 10 seems to comprise elements from DS 5 hidden-material characteristics and DS 3, new material that looks like familiar material. The bench is made out of polystyrene, which is covered in knitted cloth, and then vacuumed and hardened with wax. As a result, the polystyrene is completely hidden. The combination of materials with the new shape makes the bench look like it is made out of a familiar soft material, such as foam rubber. In reality, the bench feels hard.

The type of product in which a surprise is created also seems to influence people's appreciation of the surprise.¹⁶ In products with a complicated functionality that requires full attention from the user, a surprise probably will not be appreciated. However, in products that people can use without any cognitive effort—for example a vase—a surprise may be welcomed by the user.

Further research into people's appreciation of surprises in products will provide more definitive conclusions on how and when surprise can effectively be used as a design strategy. This research has to be aimed at providing detailed knowledge into what causes a positive or negative surprise. For example, the relative pleasant-

14 Joëlle Vanhamme and Dirk Snelders, "The Role of Surprise in Satisfaction Judgments," *Journal of Consumer Satisfaction, Dissatisfaction, and Complaining Behavior* 14 (2001): 27–44.

15 Geke D. S. Ludden, Hendrik N. J. Schifferstein, and Paul Hekkert, "Visual-Tactual Incongruities in Products as Sources of Surprise," forthcoming, *Empirical Studies of the Arts* 27:1 (2009).

16 Geke D. S. Ludden, Hendrik N. J. Schifferstein, and Paul Hekkert, "Sensory Incongruity, Comparing Vision to Touch, Audition, and Olfaction" (Paper presented at the 5th Conference on Design & Emotion, Göteborg, Sweden, Sept. 27–29, 2006).

ness of the expected and the actual feel characteristics, as well as the product attribute the surprise is experienced in (e.g., weight and flexibility) may both affect the evaluation of the surprise. Future research in these directions can help in understanding how to use surprise in product design more effectively.

Acknowledgments

This research was supported by MAGW VIDI grant number 452-02-028 of the Netherlands Organization for Scientific Research (N.W.O.) awarded to H.N.Y. Schifferstein.