

## **DESIGNERS AND USERS: TWO PERSPECTIVES ON EMOTION AND DESIGN<sup>1</sup>**

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We take as our starting point the distinction between two perspectives on products: designer and user. There is often a mismatch between these two perspectives, but both matches and mismatches constitute a major source of the affective reactions that people have to products and their interactions with them. These reactions extend over a wide range and include not only (relatively short-term) emotions, but also longer term reactions such as moods, preferences, and attitudes.<sup>2</sup>

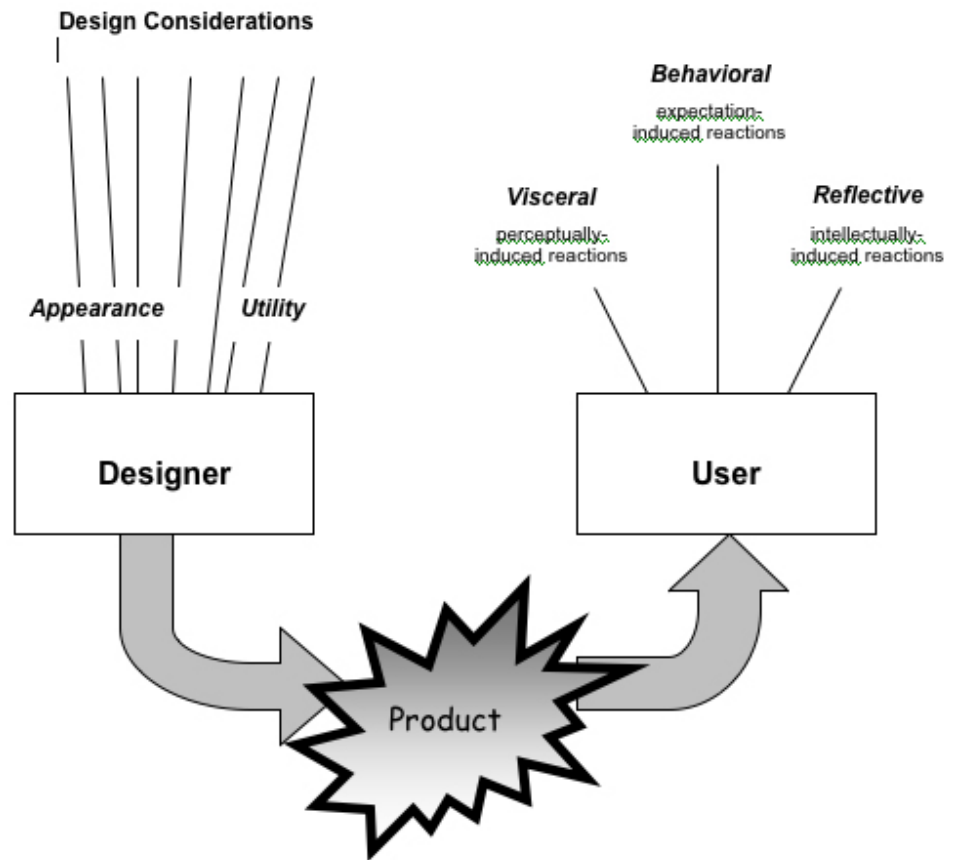
The first perspective is that of the designer. The designer works in a space that is constrained by a number of different considerations which, depending on the context, include such things as functionality, physical limitations, appearance, cost, time-to-market, characteristics of market segments, legacy and brand-identity issues, and so on. We focus on two of these in particular – functionality and appearance. We do this not because we think that other considerations are unimportant, but because these two are the most relevant for understanding the relation between emotion and design

The second perspective is that of the user, and here too, functionality and appearance are important, but for different reasons and in different ways. Specifically, from the perspective of the user, these two aspects of the design space are the principal sources of affective reactions. We focus on three particular kinds of users' emotional reactions to products—reactions that might or might not have been anticipated or intended by the designer. These three kinds relate to what Norman (2004) refers to as Visceral (perceptually based), Behavioral (expectation based), and Reflective (intellectually based) aspects of design. Figure 1 shows the relationship between the two views.

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<sup>1</sup> Paper prepared for a symposium on "Foundations of Interaction Design" at the Interaction Design Institute, Ivrea (Italy), Nov. 2003. Actually, we gave two separate – but related -- papers, so we decided to join them for the written publication. Donald A. Norman and Andrew Ortony. Departments of Computer Science and Psychology, Northwestern University. norman@northwestern.edu; ortony@northwestern.edu © 2003-2004, Donald A. Norman and Andrew Ortony.

<sup>2</sup> This work derives from some of our prior publications that examine emotion theory and the application of emotion theory to design, in particular the book *The Cognitive Structure of Emotions* (Ortony, Clore, & Collins, 1988), our research paper on affect and levels of processing (Ortony, Norman, & Revelle, In press), and the book *Emotional Design* (Norman, 2004).



**Figure 1. The Designer's View of the product differs from the User's view.** Many design considerations are considered by the designer. Here, we focus upon two: Appearance and Utility. In turn, the user has various reactions to the product. Here we focus on three fundamentally different kinds: Visceral (perceptually-induced), Behavioral (expectation-induced), and Reflective (intellectually induced).

Differences between designer and user perspectives of the same product are particularly evident with respect to the role of emotions. The designer may intend to induce emotions through the design, but because emotions (which are a special, but particularly salient form of affective reaction) reside in the user of the product rather than in the product itself, the emotions the user experiences are not necessarily the same as those intended by the designer. Certainly, some of the emotions the user might experience might have been intended by the designer, but some might not. And indeed, some might be just the opposite of those intended by the designer. Product-induced emotions are often quite idiosyncratic, depending, for example, on memories the product invokes or on the particular circumstances of use. Yet other emotions result from concerns outside the object, such as the status it might or might not bestow.

Designers have more control over users' Visceral and Behavioral reactions than over Reflective ones, but even here, the control is indirect at best. Indeed we characterize the attempts of designers to influence these reactions as attempts to provide emotional affordances. In other words, designers can do things that provide opportunities for the experience of emotions in users, just as, by building in physical affordances, they can influence the possibility of

an object being manipulated and controlled. But whether affordances are actually made use of is beyond the designer's control<sup>3</sup>.

### **THREE LEVELS OF EMOTIONAL RESPONSE**

The user's emotional responses are internally generated. In our theoretical work (Ortony, Norman, & Revelle, In press) we suggest that there are three levels of processing that we called Reactive, Behavioral and Reflective. For applications of the theoretical work to design, these translate into Visceral level design and Visceral responses, Behavioral level design and responses, and Reflective level design and responses (Norman, 2004). In order to understand how the user might develop emotional responses to a product, and to understand the relationship between what the designer does and what users feel, we need to do a quick review of the theory.

#### **Visceral Level Design and Responses**

When designers attend to the surface features – the appearance – of products, we say that they are engaged in Visceral Design. From the user's point of view, Visceral responses involve an automatic evaluation of the perceptual properties of objects, and a quick classification of them as safe or dangerous, good or bad, cold and forbidding or warm and inviting. In our theoretical work, we argue that these rapid evaluations have evolved as protective mechanisms for animals that must exist within complex and unpredictable environments. Negative assessments flag potentially dangerous experiences. Positive ones signal safe situations and places that are ideal for exploration.

Biology has provided people with a vast repertoire of dimensions that are automatically processed and interpreted. Thus, some colors are warm, some cool. Some situations, such as standing at the edge of a cliff, are immediately perceived as dangerous, while others, such as experiencing the colorful appearance and sweet taste of fruits, are immediately perceived as non-threatening and desirable. Designers can exploit these kinds of immediate perceptions.

Note that this level of design relates only to the surface appearance of objects. It is pure style, pure surface. The immediate, Visceral level, reactions to such features are not based on past experience or deep semantic knowledge and interpretation. There is no comparison with the past, no expectation of the future. All that counts is the current state. These reactions are produced by biologically-based, pattern recognition mechanisms driven solely by the here-and-now of perceivable features. This is why we call Visceral level responses "perceptually-induced." Because this level is primarily determined by biology, it is generally universal across people and cultures.

Emotion at the Visceral level is very rudimentary: in our scientific work we call it "proto-affect," because we do not wish to invoke the implications of labels such as "emotion" or "affect." Visceral level emotional reactions are too simple to warrant such labels; they are not conscious, and they are not interpreted. Nevertheless, it is in

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<sup>3</sup> The use of affordances, both physical and emotional, here follows the spirit of the definition introduced into the world of design in the book "The Design of Everyday Things" (Norman, 2002).

these reactions that higher-level feelings such as anxiety and concern, and satisfaction and pleasure have their origins.

### **Behavioral Level Design and Responses**

When designers attend to the function and use of a product, we say that they are engaged in Behavioral design. Whereas the Visceral level is innate and biological, Behavioral-level responses are learned. The Behavioral level is where skills and routine behavior reside and are controlled. Behavioral level processes are still sub-conscious and automatic, but because the associated skills and routines are acquired through learning, they also involve past experience and expectations of future states and events.

What we call Behavioral-level design includes the general concepts of usability but goes beyond this to include the physical feel of the object as well as the subjective "feeling of control." This is where precise control is essential. It is here that the smooth, viscous feel of a knob (with no backlash) matters so much; it is here that the perfect responsiveness of a well-tuned sports car is felt.

Behavioral responses are intimately connected to predictions of and expectations about the near future. These predictions give rise to affective states akin to fear and hope – primitive forms of recognizable emotions. People frequently become angry at objects that let them down and respond by kicking or hitting them. Such reactions derive from the Behavioral level, where the failure of objects to live up to expectations generates strong emotional responses. It is because of their dependence on how our routine interactions with things ought to feel that we call reactions at the Behavioral level "expectation-induced."

At the Behavioral level, although still automatic and sub-conscious, there is awareness. Moreover, because Behavioral level routines are learned, they vary from person to person, from culture to culture.

### **Reflective Level Design and Responses**

At the highest level of processing we find reflection, people's self examination of their own actions, understanding, and monitoring of progress. This is the home of self image, of meta-processing, and of the whole range of articulated emotions including emotions such as pride, shame, admiration and gratitude.

Reflection is the highest level of intellectual functioning in a person, where there can be self-examination, and the assignment of blame (hence emotions such as pride and shame). This level is conscious and self-aware. From our perspective it is the only level at which full-fledged emotions can arise, that is, emotions that incorporate a sense of feeling derived from the affective components from the Visceral and Behavioral levels, along with a conscious interpretation of that feeling.

From the designer's point of view, this is where pride of ownership, quality, and brand play major roles. Here is where people show off or hide their possessions. When designers attend to these components of

the use and ownership of a product, we say that they are engaged in Reflective design.

The Reflective level is influenced by experience and culture as well as by one's social group and by the whims of fashion. But Reflective design not only varies from culture to culture, age group to age group, but for some individuals, it can even vary from week to week, dependent upon the role they play in society. Thus, we all recognize the difference between the clothes one wears to a beach party, to a night out on the town, or to an important business meeting among company executives. These are Reflective level differences: the clothes we wear are often deliberately selected to communicate a message to others about our social status and the role we are playing in the activity. This is why we call Reflective level responses "intellectually-induced."

### **THE DESIGNER'S PERSPECTIVE**

In order to understand the role of emotion from the designer's perspective, we need to ask what the designer is trying to do. Ideally, the designer is concerned with transforming the multiple constraints and dimensions of a product into a single, coherent design. However, for the main theme of this paper, we restrict our comments to just two aspects of products: the utilitarian aspect and appearance.

#### **Emotion by Accident**

In many cases, affect responses to products arise in users without any conscious attention to affect by the designer. This is especially true in crafts, where designers consider themselves skilled craftspeople, making utilitarian objects. In such cases, we say that emotions arise "by accident": they are unintended consequences of the product or a user's interactions with it.

Consider the tyg, a multi-handled drinking cup popular in 18th century England. The three-handled example shown in Figure 2 is clearly utilitarian. The tyg is very practical. It makes it easy to pass a hot cup, for example, from one person to another, where both giver and receiver will have conveniently placed handles to hold, so that neither party will burn themselves. Moreover, if two or three people drink from the same cup, each using a different handle to hold it, their lips would use different portions of the rim – yet another utilitarian aspect of the design.

This cup, predominantly functional from the designer's point of view, might give rise to positive emotions in a user because of the ease of passing it back and forth and perhaps because of the avoidance of another's lip spot, a point to which we return in the next section.



**Figure 2. The Tyg:** Three handled drinking cup making it easy to pass from one person to another. The third handle is invisible, being directly behind the tyg in this photograph. (Photo by D. A. Norman).

The tyg is an example of a product whose primary design consideration is utilitarian. In other cases, it is can be more difficult to separate function from appearance. One would think that kettles for boiling water should be relatively simple and highly utilitarian. One might think that the primary consideration in the design of a kettle design would that of utility: the thing should be an effective device for boiling water and pouring it. However, the basic kettle has several unintended consequences that induce negative emotions in users – emotions by accident. In particular, users can burn themselves for a variety of reasons: the handles can become uncomfortably hot, the steam from the boiling water might scald the user, and the kettle might drip during pouring. Through experiences with unsatisfactory kettles, designers have sought to eliminate these unintended negative consequences and their attendant emotions.



**Figure 3:** A utilitarian kettle (the OXO Good Grips tea kettle). The shield is designed to prevent steam from burning the hand.

Thus, even when motivated primarily by considerations of utility, the designer may sometimes be concerned about potential undesirable consequences, and therefore about emotions. In such cases, we say the designer's stance vis à vis emotions is one of emotion-prevention. Consider, for example, the kettle shown in Figure 3. Such a kettle could function perfectly well (and would be easier to construct) if it were made of a single material such as stainless steel. But this would allow the handle to get hot. But notice that the choice of a non-conducting material for the handle can be motivated by either the utility-focused goal of preventing users from burning their hands, or by the emotion-focused goal of preventing the resultant anger. In either case, the end result would be the same.

Note too the shield, which was advertised as preventing the arm from being scalded by steam escaping from the kettle. In fact, the shield was not completely successful, in part because the trigger that pulled the cap off the kettle spout transmitted heat, burning the finger. Whether the shield was motivated by considerations of utility or emotion, it appears to have had the role of emotion-prevention, and although it protected the hand from steam, the result was still unsatisfactory. Accordingly, the company (OXO) brought out yet another version, shown in Figure 4.



**Figure 4. OXO Good grips uplift kettle.** This kettle, from the same manufacturer as the one shown in Figure 3, overcomes its problem. The handle is heat resistant, and the lid over the spout opens automatically simply by tilting the teapot, so no finger can get burned.

The advertising copy for this kettle (from the OXO company website) describes the kettle in very utilitarian terms:

*Simply lift the OXO GOOD GRIPS Uplift Tea Kettle by its handle and the spout opens automatically! No awkward buttons or levers, just lift and pour! The soft, non-slip handle is heat-resistant for added safety, and a large lid makes the Uplift easy to fill and easy to clean<sup>4</sup>.*

Notice how the text emphasizes the emotion-prevention stance taken by the company: “no awkward buttons or levers,” “heat-resistant for added safety,” and “easy to fill and easy to clean.”

Almost any design stance that minimizes utilitarian difficulties also serves to reduce negative emotions by reducing the undesirable effects that lead to them. As a result, it is not always possible to determine whether the design was motivated by emotion-reduction or by utilitarian goals. Thus, the addition of non-stick surfaces to cookware eliminates or significantly reduces the food that sticks to the cooking surface, thus simplifying cleanup. When designers are motivated to reduce frustration by introducing a non-stick surface, they are motivated by emotion-prevention. However, exactly the same elimination of potential negative affect in users might come about with only the utilitarian motive of maximizing performance (that is, eliminating the sticking), with complete indifference toward the possible affective consequences. The person using the pan, of course, has no way of knowing which of these two motivations lay behind the design of the non-stick pan. Nevertheless, in both cases, the net effect is the reduction of potential negative affect. This raises an important point, to be discussed in the next section, concerning the distinction between emotion by accident and emotion by design.

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<sup>4</sup> From the OXO website:  
<https://www.oxo.com/catalog/index.asp?getcategory=00001070>. Jan. 2004.)



Thus, if designers are thinking about user emotions at all when focusing primarily on utilitarian considerations, they are generally adopting an emotion-prevention stance. In many cases, however, designers are motivated by considerations of appearance as much as, if not more than by considerations of utility. Under these conditions, designers may actively focus on designing the product to cause it to generate affective reactions in users. This is what we call an emotion-promotion motivational stance as compared to the kind of emotion-prevention or emotion-indifference cases just discussed. We think of design motivated by emotion-promotion as "emotion by design."

### **Emotion by Design**

Many products are deliberately designed to evoke emotions within the user. Designers have a number of ways of doing this. Most designers have a good intuitive feel for how users are likely to react to a product, as well as a good feeling for the importance of the three aspects of design that can induce affect in users: appearance (Visceral), behavior and function (Behavioral), and image and brand considerations (Reflective).

The Visceral responses of the user primarily result from the immediate emotional response to the look or feel of the product – a "gut" reaction or what, in positive cases, is often called "the wow effect." For example, many products from the Italian design firm Alessi focus primarily on this aspect of design, making products that many see as "cute," "clever" and "pretty," often to the dismay of professional designers who believe that these reflect only surface features of the design – "mere styling," they complain. The criticism is correct, but the critics miss the point. The visceral pleasure from the surface styling is indeed enjoyed by many purchasers and users of Alessi products, so in this sense, the deliberate attempt to induce positive emotions is successful.

In Behavioral level design the designer wants the user to feel good about the behavioral interaction. This is why a designer might inject viscous oil into knobs to provide a "silky" feel, or put effort into the design of the responsiveness of a vehicle, or feedback in software design. Precision automobiles such as Porsches and Ferraris place high value on this aspect of design. Here, the designer attempts to satisfy or exceed user expectations about the nature of their interactions with the cars.

Reflective level design and responses deal with the prestige and brand components of the product. This is the intellectual side of design. Thus, high-prestige items like designer clothes and expensive watches fit into this category. Indeed, users can experience this level of emotion simply by telling others that they own one of these products ("My Ferrari is in the shop right now"). It is the responsibility of the designer to live up to these beliefs. The designer must maintain the brand identity and image.

Emotion promotion is often focused on generating positive emotions, as in the design of jewelry or ornamental products, where the generation of positive emotions is obviously the goal. Given this, one might be tempted to think that emotion-promotion motivations always

target the generation of positive affect, but this is not the case. Sometimes the goal is to create negative emotions. For example, the modern convention of using a skull and cross-bones symbol to designate poison, or the use of barbed wire or glass-shredded fences to keep people away are intended to generate negative affect – fear. And at its root, fear is the currency of deterrence. These are clear instances of deliberate attempts to invoke negative emotions by design.

But it is perhaps an oversimplification to make too sharp a distinction between emotion by accident and emotion by design. There is a middle ground. Whereas the designer of a diamond necklace is presumably motivated by the desire to design something beautiful in order to generate positive emotions in its recipient, and the designer of a kettle might be motivated primarily by considerations of utility, there are many cases where both are important. One of the standard challenges for designers is to deal with concerns over possible conflicts between these two considerations. In the design of the 2004 Chevrolet Corvette, the designers replaced the Corvette's traditional "hide-away" headlights with a more traditional design that incorporated molded lens and small high-intensity headlights. They believed that the new design was both more attractive and functional than earlier designs (satisfying the Visceral and Behavioral level requirements), but they worried whether they had perhaps lost the distinctive image of Corvette – a Reflective level concern. They were correspondingly relieved to discover that the new design still maintained the brand image.

### **THE USER'S PERSPECTIVE**

We noted at the beginning of this paper, that whatever designers intend, ultimately users' emotions depend on the emotional affordances of products. Utility and appearance are central if we are to understand the affective reactions of users to products. Emotional affordances can arise by accident or by design, although they are more likely to arise by accident when designers focus on utility, and by design when they focus on appearance. As users we easily recognize that we are sometimes inspired by the sheer beauty of an artifact – or repelled by its consummate ugliness. We are sometimes delighted at how well some mechanical device such as an automobile performs, or appalled by its ineffectiveness. And we are sometimes impressed by the cleverness of certain design features while on other occasions we are amazed at their apparent stupidity.

In some cases, products induce emotions only very indirectly, often through their conventional or symbolic significance rather than through their physical attributes. A wedding band symbolizes both the institution of marriage and the personal emotional vows between a couple, and a miniature plastic replica of the Eiffel Tower has little intrinsic merit, but its emotional affordances as a memento are considerable. A very indirect example can be found in the camera phone. The physical affordances that allow one to take photograph on impulse, to share it with onlookers, and to instantly electronically transmit it to others, also constitute powerful emotional affordances. There are many stages to this process, including activating the camera, taking the picture, sharing it with onlookers, sending it to a

recipient, and then, for the remote recipient, perhaps on another cellphone, displaying and at later times retrieving the picture. To the extent that the designer makes all aspects of this process easy the likelihood of deep, reflective emotions is greatly increased. These, and many other examples, demonstrate that both the manner in which products are configured and our interactions with them can generate affective responses and that the physical affordances of products are often also emotional affordances.

However, having said this, we need to remember that what the designer envisions in the design of a product is not always what the user experiences in using it. Furthermore, there is an essential asymmetry with respect to the utilitarian and emotional components of design. A predominant focus on utilitarian considerations often gives rise to unintended and unanticipated emotions in users—both positive and negative. However, a predominant focus on appearance, while generally succeeding in giving rise to emotion, rarely has unanticipated, utilitarian side effects.

### **“Emotion-by-Accident” Products**

The key to emotion-by-accident is that it is wholly dependent on the interaction a user has with the product. In this interaction, a user might experience some kind of emotion purely as a result of utilitarian features – a response very different from that intended by the designer.

The most common form of emotion by accident is the frustration, rage, or anger that arise from interacting with products that function poorly or that cause other forms of distress in use, such as kettles that burn the hand. However, there are also positive examples. People often have strong affective reactions – for some people, negative, for others positive – to the “throaty” sound of a powerful automobile or motorcycle engine. Indeed, many enthusiasts were disappointed when later models of their favorite vehicles changed the sounds they had grown accustomed to. In one noted case, the Harley Davidson motorcycle, the sound was so attractive and distinctive that the company trademarked it and ever since, has worked hard to ensure that all their motorcycles maintain their distinctive, iconic sound. Here is a case where the Visceral appeal of an accidental byproduct of the engine – the sound – became transformed into a Reflective level icon of the company that was purposely recreated in all models.

Expectation-based emotions arise when products fail to meet – or perhaps exceed – expectations. Many theories of emotion acknowledge that deviations from norms and expectations are a major source of emotions (see, for example, Lazarus, 1966, 1991; Mandler, 1984; Ortony, Clore, & Collins, 1988). Most of our routine interactions with everyday objects carry with them a wide range of expectations of normal performance and regular outcomes. We expect our car to start when we turn on the ignition, we expect food not to stick to the pan, and in general we expect our products to work as they should. When these expectations are violated, we tend to feel bad – we might feel frustrated, angry or cheated. When the expectations are surpassed, we tend to feel good – we might feel proud, vindicated, or elated.

## **“Emotion-by-Design” Products**

Many products are intentionally shaped by designers to create some kind of emotional responses in their users, a point already discussed in the section on the Designer’s Perspective.

People often express affection, appreciation or admiration through small gifts. The point, of course, is to generate emotions in the recipient, both through the pleasure of the gift itself and also through the indication that the gift shows that the sender remembers or cares. Numerous services have arisen that make this easy to do things like this spontaneously, just when the thought arises. Gift shops at airports or in well-frequented neighborhoods simplify the purchase and delivery of gifts, and services that enable the delivery of flowers to anyone in the world simply by visiting a local florist, by telephone, or now, by internet are widespread.

The design of services that satisfy spontaneous needs to generate emotions in others requires the integration of numerous components. No single component is necessarily new or unique, but the final combination enables a person to easily (from anywhere at any time) do something that is intended to generate an emotional response in someone else. These services are another way of designing for emotional affordances. An interesting proposal for a service of this kind is that of the Telekatessen project<sup>5</sup> from the Institute for Interactive Design at Ivrea. Here, the goal is to provide a simple way for someone to personally inscribe a surprise gift for another. This service would allow a person to spontaneously decide to surprise someone with a gift of pastry or chocolate, with a short message inscribed with icing on the top. A simple SMS message to the pastry shop sets the operation in motion. The shop sends a gift certificate and announcement to the recipient, again by SMS cell phone message. When the recipient arrives at the shop and displays the cell phone message, the shop provides the pastry, with the message already embossed in icing. Here is how it is described on the Institute for Interactive Design’s website:

*Imagine receiving a message on your mobile phone telling you that somebody you love has arranged for you to collect a surprise at a local pasticceria. When you show the message to the shop attendant, she hands you a beautiful chocolate with a sweet message from your friend crafted on it.*

The service is, of course, hypothetical, but it could be real. The design in this case is in the service, not the physical product. The impact can be large. Here, the point is to convey directly one person’s emotional feeling to another via the intermediary of the cell phone service and the pastry shop. To be sure, the design is of a service rather than a physical product, although, of course, the end result is of something edible and sweet.

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<sup>5</sup> The Telekatessen project was performed by Francesca Rosella, David Slocombe, Livia Sunesson, and Magnus Torstensson with faculty Jan-Christoph Zoels, Tony Dunne, and Fiona Raby.

## **SUMMARY**

The perspective of the designer is, of necessity, different from that of the user. This is especially true in the realm of the emotional responses a person might have for the use, ownership of, or outcomes of a product or service. Designers can hope to shape the emotional responses of their users through the development of emotional affordances, but in fact, they have no direct control over the emotions that might result.

Designers, of course, must work within a complex realm of multidimensional requirements and constraints. Here, we have examined only two aspects: utility and appearance, showing how even these two play different role for designers than for users. Designers can attempt to control the users' Visceral, Behavioral, and Reflective responses through the different features of their design and through the affordances they provide.

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