

Chapter 17

Let's Make Things Engaging



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Kees Overbeeke (1952–2011)

Prof. Dr. Kees Overbeeke was appointed full professor at Eindhoven University of Technology (TU/e) for Intelligent Products and System Design in the Department of Industrial Design in May, 2006. Kees Overbeeke studied psychology at the Katholieke Universiteit Leuven (1974). After working there he moved to the Faculty of Industrial Design Engineering at Delft University of Technology where he earned his Ph.D. (1988) in spatial perception on flat screens. He headed the Form Theory group as an Associate Professor until his move to the Department of Industrial Design of TU/e in 2002. During the academic year 2005–2006 he was invited as the Nierenberg Chair of Design at Carnegie Mellon's School of Design in Pittsburgh. At TU/e he headed the Designing Quality in Interaction group until September 2011.

Kees was one of key figures who introduced the HCI community to Industrial Design. He was dreaming of the impossible, trying to rebalance thinking and doing, to connect ethics and aesthetics, and to educate new kinds of students who are able to combine design, science and engineering in their work. And he succeeded. The imaginative designs that he and his students presented are still influential to this day. As co-editors of the 2003 Edition with Kees, we remember the real sense of fun he brought to everything he did. As well as being an editor of the 2003 Edition, Kees was an author on Chaps. 23 and 24.

2003 Chapter

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1 Introduction

Technology and electronics have given us many positive things. However, the appearance of and the way we interact with products have changed consequently resulting in a less engaging relationship with products towards the end of the 20th century (Hummels 2000; Overbeeke and Hummels 2013). Machinery withdrew to the background and control by means of buttons and icons became prevalent (Fig. 1). The physicality of the machinery became an unnoticeable means to deliver the goods.

People all have senses and a body with which we can respond to what our environment affords (Gibson 1986). Why, then, do human-product interaction designers not use these bodily skills more often and make electronic interaction more tangible (Fig. 2)?

And, as humans are emotional beings, why not make interaction a more fun and beautiful experience? We believe that the physicality of the product should be reinstated, to restore engagement. Fun, as such is not the issue, engagement is. This contribution focuses on those neglected aspects of human-product interaction.

2 What Is Wrong?

Many products are designed by people not trained in product design. The resulting products reflect their maker’s training. Psychologists make products that are very “cognitive” (or instruct designers to do so). Software engineers design interfaces that resemble the logic of programming. Cooper (1999) has made a convincing analysis of the latter phenomenon. As a solution, he proposes to get away from “technological artefacts whose interaction is expressed in terms in which they are constructed” (p. 27).

Furthermore, everybody claims to take man, not technology, as his starting point. The talk is all about user-centred design. But what does this mean? This faith



Fig. 1 Buttons and icons stand between the user and the machine’s functionality

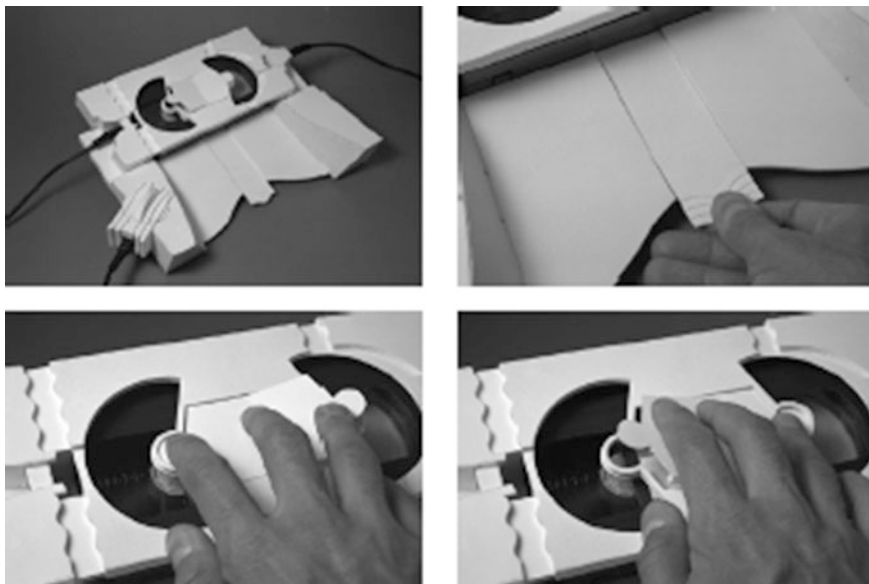


Fig. 2 The action of the user opens up the functionality of this video player. Starting top-left clockwise: the cassette remains visible whilst in the machine, pulling a ribbon triggers eject, and fast-forward/reverse becomes intuitively clear through a toggle placed between the tape reels (Djajadiningrat 2004)

is often professed but seldom applied. We think that user-centred design should be interpreted as design, which shows respect for people as a whole. For the sake of analysis, people's skills, which are used when interacting with products, may be considered on three levels: cognitive skills, perceptual-motor skills and emotional skills. In other words: knowing, doing and feeling; the wholly trinity of interaction (Overbeeke et al. 2002). In the 20th century, research on human-product interaction, however, has concentrated on cognitive skills. Products have become "intelligent", and intelligence has no form. Design research, quite naturally, turned to the intelligent part of humans and thus to the science of cognition to find answers. This has resulted in interface design placing a heavy burden on human intellect. For example, designers start grouping and colour-coding related functions, adding displays with an abundance of text and icons, and writing logically structured manuals. And many design methodologies also suffer from the "logical" disease. Emotions are narrowed down to fun and fun becomes a glued on quality. Products smile at you. I'm not dying to open a bottle of good white wine with a smiling corkscrew. When addressing emotions many designers take a Walt Disney approach and, by doing so, sidestep the real issue: addressing emotions in an adult way. In our opinion the design of electronic products has got stuck as a result of this rather cognitive approach, which neglects the user physically and emotionally. We think that an approach, which mainly addresses the rational and quantifiable human skills, simply does not cut it.

3 How Do We See It?

Users are not interested in products; they are in search of challenging experiences. Therefore the designer needs to create a context for experience, rather than just a product. He offers the user a context in which he may enjoy a film, a dinner, cleaning, playing, working, *with all his senses*. Efforts on improving usability focus on making things easier. However, there is more to usability than ease of use. A user may choose to work with a product despite it being difficult to use, because it is challenging, seductive, playful, surprising, memorable or even moody, resulting in enjoyment of the experience. No musician learnt to play the violin because it was easy. Bringing together ‘contexts for experience’ and ‘aesthetics of interaction’ means that we do not strive for making a function as easy to access as possible, but for making the unlocking of the functionality contribute to the overall experience.

Usability is generally treated separately from aesthetics. Aesthetics in Industrial Design appears to be restricted to making products beautiful in appearance. As the ease of use strategies do not appear to pay off, this has left us in the curious situation that we have products, which look good at first sight, but frustrate us as soon as we start interacting with them. We think that the emphasis should shift from a beautiful appearance to beautiful interaction, to engaging interaction. And this should not be a glued on quality. Beauty in interaction is the core, the starting point of interaction design.

This calls for a re-think of product design from the ground up. Design should be given back to designers, as a part of a multi-disciplinary team. Products should elicit the user to engage with them through their physicality. Fun can result from engagement, but is not a goal as such. Design is not about the smile on the product, it is about the smile in the user’s heart.

4 How Do We Do It?

But what should designers do once design is given back to them? How can designers open up the products functionality while engaging the user in a beautiful way? The answer to this question is multi-layered and as yet incomplete. In several publications we touched upon parts of the answer. In the first part of this section we mention two, starting from the more general level of a context for experience to the level of design rules of thumb for augmenting fun and beauty. In the second section we give a few examples, as we believe actions speak louder than words.

4.1 *Trying to Answer the Question*

In her Ph.D. thesis Hummels (2000) makes a strong case for engagement as a means to augment fun and beauty. She argues that the shift towards involvement during interaction means that the designer's emphasis should be placed on a beautiful, engaging interaction with a product. Consequently, the focus shifts towards the aesthetics of interaction. In general one could say that the aesthetics of interaction is the sense of beauty that arises during the interplay between a user and a product in their context. What creates this sense of beauty? Why do some products resonate with a user, while others do not? She believes that five aspects are essential to evoke this sense of beauty. She considers the following five aspects essential.

1. Functional possibilities and performance of the product

A proper functioning product forms the basis of the aesthetics of interaction. A product that does not do what it is supposed to do, will never allow the user to get intimate and experience the beauty. Spiffy solutions that work well can smooth the way for intimate interactions.

2. The user's desires, needs, interests and skills (perceptual-motor, cognitive and emotional)

A contextual design approach is based on the experience of the individual. A product may resonate with one person, whereas another person may be indifferent to it. The user's character, skills, needs (short-term and long-term), mood, etc. determine the value of the interaction for an individual.

3. General context

Although a designer is not able to control the general context in which a person will use his product, this context can influence the experiences of the user when interacting with the product.

4. Richness with respect to all the senses

Aesthetic interaction requires richness that covers all the senses. Not only does it refer to richness in visual aspects of the product, but the wealth and subtlety of auditory, olfactory, flavoury, tactile and kinaesthetic aspects during interaction, are at least as important to achieve a beautiful interaction and an engaging experience. This richness bears on feed-forward as well as feedback (see below). Moreover, designers need to exploit the range and diversity of design solutions to evoke or intensify the range of feelings (although they can never enforce a specific experience).

5. Possibility to create one's own story and ritual

Each product tells a story about the user and the relationship between them as it evolves from the moment of purchase onwards (Djajadiningrat et al. 2002).

Intimacy with a product can be enhanced when the product stimulates the user to create his story and rituals during usage. A product should be an open system, which is not an open book, rather a tempting means for exploration and interaction. Due to the advancing digital technology, intelligent products can adapt to the user and actively help to create a never-ending story.

These are very general aspects: they do not tell the designer what exactly he has to do to realize them when designing. Therefore, a few years ago we published a pamphlet with 10 rules to augment fun and beauty in interaction design (Djajadiningrat et al. 2000a, b). These 10 rules do not constitute a guide to “good” design however, and we did not mean to provide one.

Here are the 10 rules:

1. Don't think products, think experiences.

The designer needs to offer the user a context in which he may enjoy a film, dinner, cleaning, playing, working with all his senses. We talk of creating a context for experience rather than just an experience, because we cannot impose a particular experience on a user, who is bound to explore the design in his manner. A design should offer the user the freedom for building his or her experiences.

2. Don't think beauty in appearance, think beauty in interaction.

Usability is generally treated separately from aesthetics. Aesthetics in product design appears to be restricted to making products beautiful in appearance. As the ease of use strategies do not appear to pay off, this has left us in the curious situation that we have products, which look good at first sight, but frustrate us as soon as we start interacting with them. We think that the emphasis should shift from a beautiful appearance to beautiful interaction, of which beautiful appearance is a part. Dunne (1999) too talks of ‘aesthetics of use’: an aesthetics which, through the interactivity made possible by computing, seeks a developing and more nuanced cooperation with the object—a cooperation which, it is hoped, might enhance social contact and everyday experience.

3. Don't think ease of use, think enjoyment of the experience.

Current efforts on improving usability focus on making things easier. However, there is more to usability than ease of use. A user may choose to work with a product despite it being difficult to use, because it is challenging, seductive, playful, surprising, memorable or rewarding, resulting in enjoyment of the experience. No musician learnt to play the violin because it was easy. Bringing together ‘contexts for experience’ and ‘aesthetics of interaction’ means that we do not strive for making a function as easy to access as possible, but for making the unlocking of the functionality contribute to the overall experience.

4. Don't think buttons, think rich actions.

The controls of the current generation of electronic products, whether physical or screen-based, require the same actions. By increasing the richness of actions, controls cannot only be perceptually differentiated, but also motorically. Here again the goal is not differentiation for differentiation's sake, but the design of actions, which are in accordance with the purpose of a control.

5. Don't think labels, think expressiveness and identity.

Not only do current electronic products themselves look highly similar, their controls, whether physical or screen-based, also are often hard to tell apart. This has made it necessary for controls to be labeled with explanatory texts and icons, which are either illegible or unintelligible, regardless of whether they are physical or screen-based. We think that instead designers should differentiate between controls to make them look, sound and feel different. More importantly though, this differentiation should not be arbitrary. The 'formgiving' should express what purpose a product or control serves. This would require a replacement for the current aesthetic with rows of identical controls which so heavily relies on repetition as a means to achieve a unified and aesthetically pleasing whole, for which the expression of the individual controls are sacrificed.

6. Metaphor sucks.

The use of metaphor has become commonplace in both HCI and product design. 'We could use a such and such metaphor' is an often-heard statement. We think the usefulness of metaphor is overrated. When trying to describe a design in absence of the thing itself it may be necessary to rely on metaphor. But this does not necessarily mean that whilst interacting with the product the user understands the design through one single, consistent metaphor. Gentner and Nielsen (1996) and Gaver (1995) also point out the limits of perfect fitting metaphors. The challenge here is to avoid the temptation of relying on metaphor and to create products, which have an identity of their own.

7. Don't hide, don't represent. Show.

Current product design has a tendency to hide the physical components, even those that are highly informative to a product's operation. A choice is made in favour of an alternative representations rather than physical manifestation.

For example, a videotape becomes completely hidden inside a video recorder when inserted and is then represented on a display (Fig. 3). In photocopiers paper is put inside drawers so that we need sophisticated displays to tell us which paper format lives where. It is the designer's task to make these last remaining physical hold-ons visible and make optimal use of them in the interaction process.

8. Don't think affordances, think irresistibles.

Both the HCI and product design communities have borrowed the term affordances from perception-psychology and have hooked onto mainly its structural aspects whilst neglecting the affective aspects. We lament this clinical interpretation

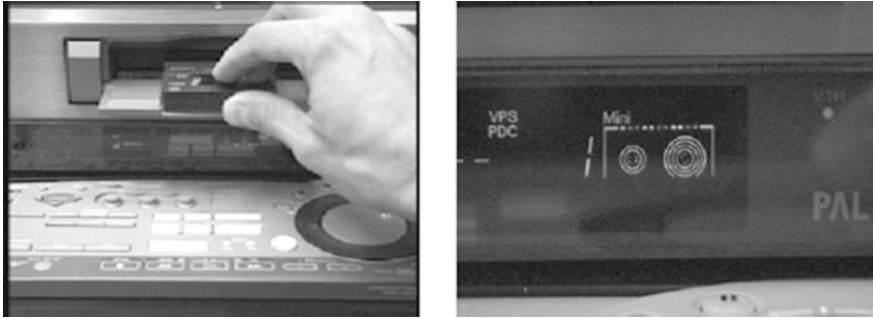


Fig. 3 First the tape is hidden completely inside the machine, to be then represented on a display

of affordance. People are not invited to act only because a design fits their physical measurements. They can also be attracted to act, even irresistibly so, through the expectation of beauty of interaction.

9. Hit me, touch me, and I know how you feel.

We may slam doors in anger, chew a pen or write with it frantically, sip our coffee or gulp it down in haste. If we design products, which invite rich actions, we can get an idea about the user's emotions by looking at these actions (Wensveen et al. 2002).

10. Don't think thinking, just do doing.

HCI methodologies often separate the cognitive, verbal, diagrammatic and abstract 'thinking' design phase from the visual, concrete, 'doing' phase, and emphasize the former. In product design, 'doing' is seen as equally valid as thinking and as beneficial to the design process even in the very early stages. Handling physical objects and manipulating materials can allow one to be creative in ways that flow diagrams cannot. In the design of the physical, knowledge cannot replace skills. You can think and talk all you want, but in the end, the creation of contexts for experience, the enjoyment and the expressiveness require hands-on skills.

4.2 Examples

Keeping the last of the 10 rules in mind let's turn now our attention to the examples.

In his graduation project, Frens used new methods to explore aesthetics, interaction and role (Djajadiningrat et al. 2000a, b). One of these methods is designing for extreme characters. Designers create products for fictitious characters that are emotional exaggerations. This helps to expose character traits which otherwise remain hidden. For example, Frens used an hedonistic, polyandrous twenty-year old woman as an extreme character. This choice of character required Frens to come up

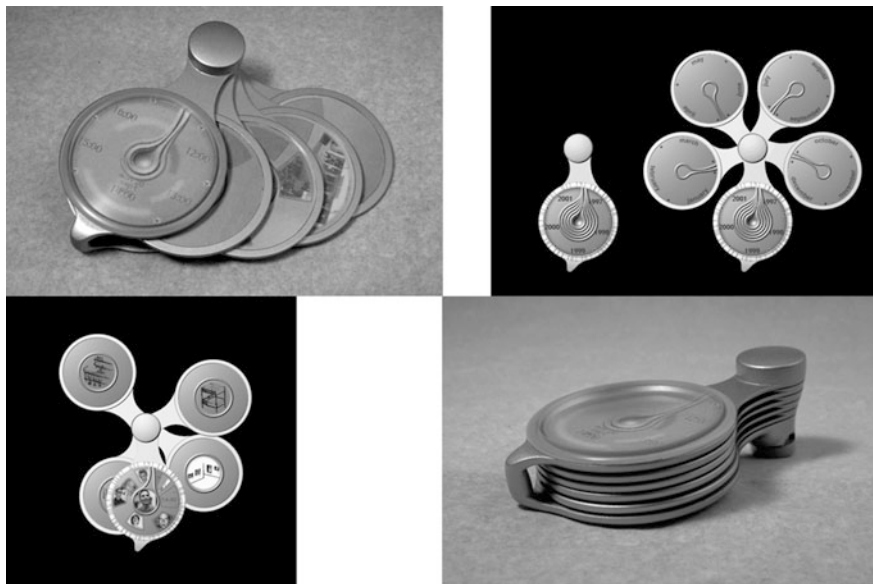


Fig. 4 Appointment manager (top-left). Public and private mode (top-right). With rotating ring around the top screen (bottom-right). Boyfriend profiles (bottom-left)

with an appointment manager which allows the woman to maximize the fun in her life and which supports her in juggling appointments with multiple boyfriends who may not know of each other. In his final design, Frens aimed to achieve aesthetics of interaction by treating hardware and on-screen graphics as inseparable. The user navigates through time by means of a rotatable ring, which sits around the top screen (Fig. 4).

The appointment manager of the polyandrous woman makes use of five circular screens, which fold up in a fan-like manner. To support the woman in her polyandrous behaviour, the fan is usable in two modes. In the first mode, which is called public mode, all the screens are folded in and only the top screen is visible. This is the mode, which she can use without worries while amongst other people. In the second mode, called private mode, the screens are folded out. In this mode the woman can check upon sensitive information.

Through the playful positioning of the screens, the woman can rate and compare her boyfriends on a fun profile with issues such as dining, shopping, partying, sex etc. The appointment fan fits the twenty-year-old's attitudes. It helps her maintain her hedonistic lifestyle by remembering attributes of boyfriends and allowing her to adjust these through an uncomplicated, playful interface. The dual modes allow her to use the device in public without disclosing the details of her agenda, satisfying her special need for privacy.

The direct coupling between the rotation of the ring and the flow of characters over the screen makes for a beautiful interaction. Through the positioning of the

Fig. 5 An alarm clock
(design: De Groot and Van de
Velden)



multiple screens, the woman can rate her boyfriends on various issues such as shopping, dining, sex etc. in a playful manner. These aspects of the design show respect for the user's perceptual-motor skills, not only from a structural but also from a fun point of view.

The next example (Fig. 5) is an alarm clock from a student exercise. The alarm clock consists of two parts, a base station and an alarm ball. The alarm ball is used to set the wake up time and consists of a display strip flanked by two rotating semi-spheres. If the left hemisphere of the alarm ball is turned while holding the display strip, the hour of the waking time is adjusted. If the right hemisphere is rotated, the minutes are adjusted. The size of the ball and the way it matches the recess in the base station afford picking up and the two halves afford rotation. But more importantly, the positioning of the halves adjacent to the hour digits and the minute digits, informs the user of what he will adjust.

The alarm clock can sense the distance between the base station and the alarm ball. The further the user moves or throws the alarm ball from the base station, the louder, the more aggressive and the more insistent the waking sound may be in the morning. The closer the alarm ball is placed to the base station, the softer and more gentle the waking sound will be. Here it is both the appearance and the actions that are carriers of meaning. Throwing the ball to the other side of the room is a different action from placing it just to the side of the base station and can thus have different consequences. This is also consistent with the actions the user has to carry out to silence the alarm clock. The further the alarm ball is away from the base station, the more of an effort he has to make to find it, to pick it up and to place it over the speaker to muffle the sound. Here again the fit of the alarm ball to the recess and the idea of covering the loudspeaker inform the user of the consequences of his action. The user's actions thus become carriers of meaning and influence the alarm's behaviour.

If the left hemisphere of the alarm ball is turned while holding the display strip, the hours of the waking time are adjusted (top Fig. 6). If the right hemisphere is rotated, the minutes are adjusted (bottom). The alarm clock can sense the distance



Fig. 6 Turning of the hemispheres

between the base station and the alarm ball. The further the alarm ball is placed away, the more insistent the sound will be in the morning. The user's actions thus become carriers of meaning and influence the alarm clock's behaviour.

5 Conclusions

This chapter summarises a position that has been developed over many years and a number of projects. Our work can be thought of as a manifesto for design. Our arguments are deliberately provocative. For too long psychologists have led designers to make overly cognitive designs. We repeat: design should be left to designers! Too often fun is a “glued on” property and interfaces smile. Enjoyment should not be an afterthought and fun does not have to be cute. In order to design enjoyable products we must design for engagement on every level and the physicality of products must be restored, product design must address the user's action potential and capacity to appreciate sensory richness. Products must elicit rich interaction from the user. In this way, not only the functionality but beauty and fun in interaction are opened up. And there is more. Rich physical interaction offers

even more possibilities. Products might ‘read’ the user’s emotions and react to it in different ways. (See for example Wensveen and Overbeeke, Chap. 24 in this book).

We believe our approach frees products from clumsy interaction and opens ways to beauty and fun. From a product design perspective, the appearance of interactive products can no longer be considered as arbitrary. A tight coupling between action and appearance in interaction design is necessary. Appearance and interaction need to be designed concurrently.

Acknowledgements Part of this chapter was published earlier in Djajadiningrat et al. (2000a, b). The Frens project was conducted in collaboration with Bill Gaver of RCA London. Most of the work reported was done when all authors were affiliated to the Delft University of Technology. Almost 15 years after the intional publication, we are still exploring and developing engaging designs, although our scope has expanded to product-service systems and large socio-technical systems. Out of respect for Kees Overbeeke, we haven’t introduced any new work and refer you to more recent publications to see how we have continued his legacy. Kees was dreaming of the impossible, trying to rebalance thinking and doing, and many of his ideas have been adopted. Kees, your legacy will stay in our hearts, minds and our designs.

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