

Making Intimacy Tangible

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Abstract: Product design should address the user's action potential and sensory richness. This frees products from clumsy interaction and opens ways to the more personal and intimate. In this paper we describe a conceptual system to use e-mail for intimate communication. The system consists of an e-pen, e-paper to write messages, tags to handle messages, a portal to the Internet and a cube to store messages. These physical objects appeal, by their very nature, to handle them. When you handle objects, you inescapably do it in an expressive way. The emotionally smart objects then read the mood you're in, and show their understanding by, like a chameleon, changing colour patterns. These patterns escort the message to the addressee who has a similar set of objects inviting her to "taste" the messages. Tangibility in interaction design thus opens up emotional skills through perceptual-motor skills [2] by intrinsically linking the action-eliciting power of objects (affordances) to the expressive power of human behaviour.

Key words: *Design, Intimacy, Emotion, E-mail*

1. Introduction

Product design is about the creation of meaning in form. In itself, this is not an easy thing to do. Moreover, information technology has complicated the profession by adding innumerable functions or "features". Making these functions accessible to the user drives designers crazy. At the same time these products seem to backfire. The user's frustration grows too. Why do nowadays products make you feel stupid instead of happy? Why do you feel condemned to use them, instead of tempted to interact with them? Alan Cooper [1] has made a convincing analysis of this 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). We should design the interaction with products in terms, in which the user is constructed, i.e., to act.

How can this be done? We believe that respect for man as a whole should be the starting-point for interaction design. For the sake of analysis, man'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. Research on human-product interaction, however, has shifted to cognitive skills. This shift is easily understood, as there is no electronic counterpart for the mechanical world-view that still dominates Western thinking. We understand the world of moving machines, since we understand the mechanics of our bodies. The electronic world is more opaque to us. What happens inside electronic products is intangible: it

neither fits the mechanics of our body or the mechanical view of the world. We do not understand electronics since we cannot touch it. Furthermore mechanical artefacts give us feedback, i.e., information about what we did to them, and even inherent feedforward, i.e., visible information about how they are going to react. Electronic devices often give us no information whatsoever about what we did to them (you cannot see if you pressed a button) and about what they are going to do and why. From time to time you enter a nirvana of miscomprehension. The reason is that these machines are designed badly. Design is about creating objects that *mean* something to us. And, as we all have senses and a body with which we can respond to what our environment affords this meaning is essentially about what I can do with products. Meaning through interaction, not through abstraction.

In this paper we take respect for the human as a whole as the starting point for design. The user is in search of a positive experience. 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, dinner, cleaning, playing, working ... with all his senses. It is the designer's task to make the product's function accessible to the user whilst allowing for interaction with the product in a beautiful way. Aesthetics of interaction and engagement is the goal. The user should experience the access to the product's function as aesthetically pleasing and engaging. Or, at least, she should not be frustrated ([3], [4]).

We believe that, to reach this goal, the user's action potential and sensory richness should be addressed, his perceptual-motor and emotional skills. Physicality is a pre-requisite. Only objects challenge us to do things with them, and, by this mere fact, to do it in a subtle, expressive, aggressive, creative way. Tangibility thus opens up emotional skills through perceptual-motor skills [2].

This is a far cry from the usual interaction with "cold" electronic products. Two examples make this clear. First, Stephan Wensveen designed an alarm clock that reads a user's mood while he inputs the wake-up time. The mood (emotional skills) is read from the way he interacts with the machine (perceptual-motor skills) while feeding it information (cognitive skills). A product cannot stay passive in the interaction to allow for all this. First it should elicit actions rich in emotional content through rich action possibilities. Second, it should tell the user that it understood the time-set and the emotional content of his actions through feedback. A screen shows the wake-up time. A dynamic trace of the action gives inherent feedback, feedback resulting from the actions of the user revealing his mood. And the clock adapts the waking sound to the mood, and can learn over time from the user's reaction in the morning [5].

Second, this approach opens up the possibility to explore the use of electronics in a more personal, confidential, intimate way. Internet communication in its current form is too impersonal and doesn't correspond to how we experience relationships in everyday life. E-mail and chat-programs do not support subtle and rich communication. By not exploiting human skills they inhibit a personal touch in messages. The only way to make messages more personal is by changing fonts or layouts, or by using *emoticons*. Every other form of personalization has to come from the style of writing. The form in which messages appear to the recipient contains no clues about the sender's personality or mood, whereas in the physical world we can instantly recognize the sender by her handwriting. We can even see from the handwriting if the message was written in a hurry, slowly and carefully, if a draft was made, etc. The paper used also adds information to textual messages. Heavier paper usually indicates that the message also has more emotional weight, and lighter paper is often used for casual messages.

With current Internet communication no attention is paid furthermore to the way individual relationships affect us. We assign different values to relationships, treating them accordingly. This difference in the emotional value of

relationships is in no way visible in the current e-mail programs. There is no relational discrimination whatsoever in the sense that everybody, regardless of the level of intimacy, dissolves into the anonymity of a contact list. All messages, either sent or received, look exactly the same and are piled up in a list of insignificant looking subject titles. This seems very strange, especially since in real life we see that the way people handle mementos is often based on their emotional value. People build up a relationship with their mementos. They are the physical traces of interpersonal relationships. Letters and gifts are treated carefully and thoughtfully since they can easily be damaged or destroyed.

In the following we describe a system in which we address the user in a richer way. It offers the opportunity to make relationships and accompanying Internet-communication more intimate and more personal

2. Intimate e-mail

An important aspect of intimacy and personal touch is that people leave traces, elements that visualize or represent someone's personality. We see these traces as a powerful way to personalize and individualize Internet communication. The first way in which we want to achieve this is by bringing back handwriting, which is very typical for a person. Handwritten messages speak louder than words alone. Therefore, our design is a system in which ePaper is used in combination with a digital ePen

2.1 Writing

The ePen and ePaper work like a regular pen and paper but are electronic. The ePaper is like heavy paper (140 grams approximately) and is covered with eInk. It can be written upon by using the ePen, which is available both as a fountain pen and as a ballpoint, in black and in blue. Currently, the development of eInk, ePaper and ePens is still in an experimental phase. But in this project we see this merely as a matter of time, and make use of the possibilities ePens and ePaper will offer designers.

To create a message you take a piece of ePaper and the ePen of your choice and start writing. The back of the ePen contains an eraser so it is possible to correct any mistakes. Aside from writing and correcting messages, we use the ePen to take Internet communication a step further, using writing characteristics to communicate moods. The ePen contains a microchip with which it can analyse a person's writing style. Wensveen [4] has convincingly shown that the user's mood can be read from his behaviour in interacting with products. Within this project you can think for instance of writing speed and regularity as an expression of the user's mood, or of the number of corrections, or the number of pauses during the writing process. Having gathered this information the ePen composes an expressive colour pattern. For this composition, colours and patterns are used that evoke particular moods. They are stored in the ePen's memory. The composed colour pattern will be sent along with the message. At the recipient's end, it serves as emotional feed-forward. A cheerful colour pattern prepares the recipient for a different kind of message than a sad colour pattern. We come back to this in just a minute. Either way, it is necessary to get the message out of the ePaper in order to send it. This brings us to the second part of the system which we call Tags.

2.2 Tags

Tags are small, three-dimensional objects that by their shape identify a person (Figure 1). Tags are used for both sending and receiving messages and for moving messages from one place to another. They contain the address of the recipient. Therefore the message is automatically sent to the right person, assuring privacy. Additionally, the Tags visualize the commitment that is needed for intimate relationships because both parties

have to exchange Tags in order to be able to communicate. To move messages, the Tags are used to “vacuum” and “pour” messages from and into carriers. Whenever a Tag has vacuumed a message, it changes from white to the colour pattern composed by the ePen, which was based on writing style. To get a message out of the ePaper you have to take the Tag of the desired recipient and move it over the message (Figure 2). The Tag vacuums the message out of the ePaper. The way this is done determines the way the message will eventually appear to the recipient. You could say that the Tags contain two layers of traces.

The first layer is the way the Tags are moved to vacuum the message. The second layer is the expressive colour pattern the Tag gets.

2.3 Portal

To send the message you need the third part of the system, the Portal. The Portal is a personal gate to Cyberspace (Figure 3). Each Portal has its own address.. Messages are sent directly to a Portal, where the recipient can only take them out of Cyberspace using the Tag exchanged with the sender. Both the personal Portal and a personal Tag are needed to receive the message (see them as the keyhole and the key). But aside from sending and receiving messages via Cyberspace, the Portal is used to visualize the transition from physical information to virtual and vice versa.

2.4 Sending a message

To send a message you take the appropriate Tag. The colour pattern of the Tag indicates that it contains a message. Then you have to place the Tag onto the Portal and the message flows into Cyberspace in a way that corresponds with the shape of the Tag. The colour pattern of the Tag flows into the Portal, making the Tag white, i.e., empty. This transition from physical to virtual follows the emotional load of the message (Figure 4). For instance, a sad message will be reluctant to be sent whereas a happy message will be avid to be sent. The former message will flow in a slow, viscous manner whereas the latter will flow like water. When both the Tag and the Portal are white again, the message is sent.

2.5 Receiving a message

The message now travels through Cyberspace to the Portal of the recipient. Once this Portal is found the message waits until the Portal and the appropriate Tag are in each other’s vicinity (within a range of 50 cm). When key and keyhole are at the same place, the message comes towards the Portal and notifies the recipient that a new message has arrived. It stays at the outer edge of the Portal and creates a signal pulse corresponding to the shape of the sender’s Tag. This means that messages might never be read if a Tag is thrown away, simply because



Fig. 1 Tags

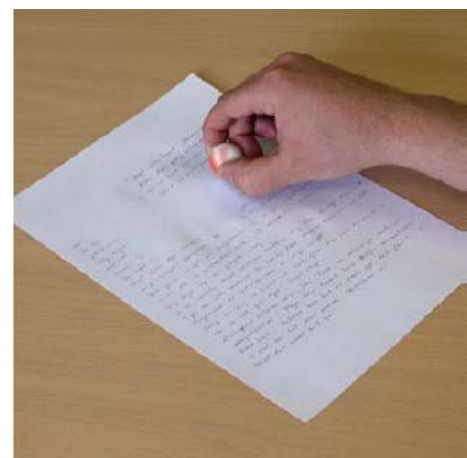


Fig. 2 Vacuum the text into the tag



Fig. 3 The portal

both the Tag and the Portal are needed to receive a message. If a message will not be taken out of Cyberspace within a day, it will return to its sender. He can either choose to send the message again, or pick up the phone.

However, let's assume that the message notifies the recipient of its presence. The recipient places the corresponding Tag onto the Portal, making it possible for the message to flow from Cyberspace into the Tag (Figure 5). The message becomes a part of the physical world again. The Tag receives its colour pattern giving the recipient emotional feed-forward. The recipient takes the Tag and places it on the ePaper. The message flows into the ePaper the same way it was vacuumed in (Figure 6). It contains all the richness that was put in by the sender.

2.6 Storing and retrieving messages

After reading the message you have the choice either to keep the message or throw it away. With respect to the latter option we emphasize that we don't want to encourage people to throw away intimate messages. But if you really wish to throw a message away you can vacuum it back into the Tag and stick a paperclip or a pin inside its "plug", pushing a reset button. The message will then slowly leak out of

the Tag into thin air.

If you wish to keep the message you have to suck it out of the ePaper with the appropriate Tag and use the fourth and final part of the system. The Cube. The Cube is the safe haven in which you can keep messages. It is a 70x70x70 mm object of frosted glass. On it messages are small, shiny spots, creating a mini-universe of messages over time (Figure 7). The spots have the colour pattern that the corresponding messages received while they were written. This enables you to identify the messages in the Cube.

The spots visualize the value and beauty of relationships by their appearance, making the Cube look like a precious box filled with stars. The Cube gets prettier when it gets older and, despite its simple form, can turn out to be one of the most valuable objects a person has. Old messages get pressed into the background by new messages. Newer messages thus appear bigger, older ones smaller.

The Cube is used in general to manage messages. If you wish to keep a read message, you vacuum it out of the ePaper with the appropriate Tag and hold the Tag against a side of the Cube. The message flows out of the Tag into the Cube, finding a place among other messages that were already put in this particular side (Figure 8). This procedure means that you can sort messages by placing them in the Cube. Being an object without orientation - it has no strict top or bottom - the Cube doesn't force you to use specific sorting criteria. It enables you to use your

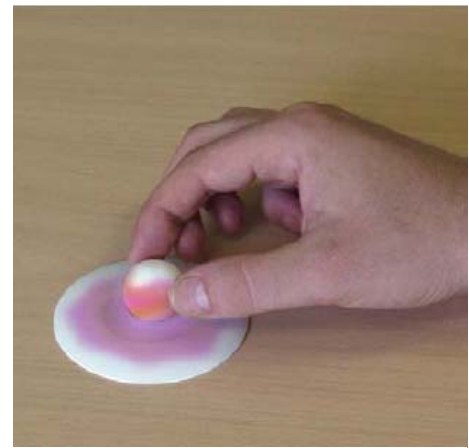


Fig. 4 The message flows in the portal

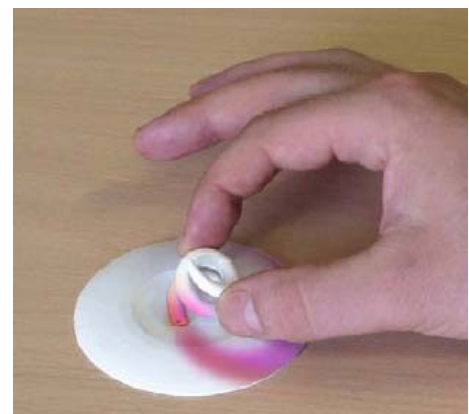


Fig. 5 Receiving a colour pattern, i.e., a message



Fig. 6 A message flows on the paper

own. This makes the Cube a more personal object since different people can use their Cube differently.

Inside the Cube the messages start floating around, only visible from the side in which they were put. This movement corresponds with the way the accompanying message was once vacuumed into the Tag of the sender. If you want to browse through the messages kept in the Cube you can place it near the ePaper and catch individual spots by touching them with your finger. Touching a spot makes the message appear on the ePaper until you take your finger off. When a spot is touched, all other spots come to a standstill so they can be more easily touched as well. You can facilitate searching for a specific message by using a Tag as a person filter. To do this you have to hold the Tag of this person *near* the Cube (Figure 9).

This makes all the messages not coming from this sender invisible, filtering out the right ones (taking the Tag away from the Cube makes all the messages visible again). These messages can now be touched and read. Once the right message is found you can choose to move it to the ePaper again, for instance if you want to take this message along individually. Taking a message out of the Cube is done in a similar way as putting one in. You place the Tag of the sender *on* the message (the spot in the Cube) and it will again be vacuumed inside.

3. Evaluation and conclusions

We strongly believe that tangibility in interaction design is a way to open up emotional skills through perceptual-motor skills by intrinsically linking the action-eliciting power of objects (affordances) to the expressive power of human behaviour [2]. Therefore we took great care in prototyping the objects and simulating their behaviour. Making conceptual systems is a typical design approach. As the context is intimacy, subtlety is a prerequisite.

But conceptual does not mean arbitrary. Therefore we let users try informally the (partly wizard-of-Oz) system as they visited our lab. These visitors were really taken in by the beauty of the interaction. The attractively flowing patterns, partly created by the user's behaviour and the colourful patterns, readily appealed to people. The fact that handwriting was reintroduced into the system was experienced as empowering. The system has an installation-like quality. Once started, people find it difficult to stop. It illustrates the unlocking of "areas that are not easily addressed in the framework of science and engineering" [3, p. 38]. We want to combine "beauty and brains, pleasure and usability" [3, p.38].

With the same drive we built and tested several systems [4]. Wensveen [5], for instance, built and tested an

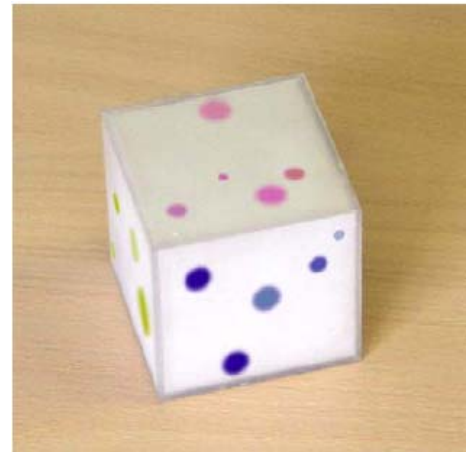


Fig. 7 The cube

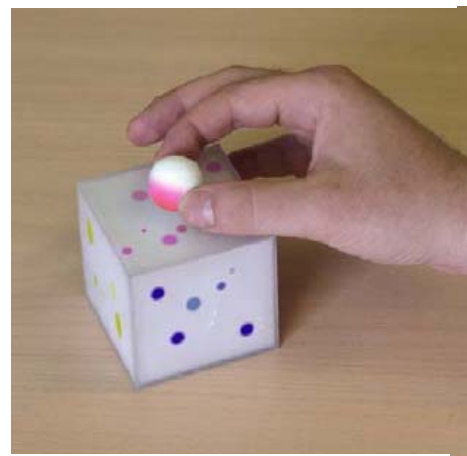


Fig. 8 Storing the message

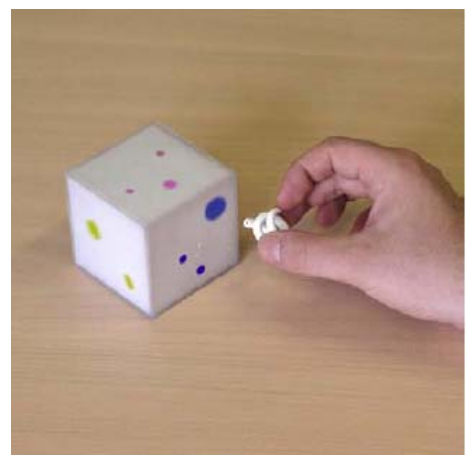


Fig. 9 Filtering with a tag

alarm clock that reads peoples mood while they are setting the wake-up time. Freedom of interaction, being able to set the time in a myriad of different ways, is a prerequisite.

Finally, this approach not only remedies the current interface malaise [1], it might also be a way out of the cul-de-sac the design community is in [2]. We believe this is the way to true diversity in products and true engagement of the user.

Acknowledgment

The design case was conducted in co-operation with Tony Dunne PhD of the Royal College of Art, London. At that time the first author was affiliated with the TU Delft.

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