

# 19

## CO-EXPERIENCE: PRODUCT EXPERIENCE AS SOCIAL INTERACTION

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### I. FROM USER EXPERIENCE TO CO-EXPERIENCE

Since the late 1990s, many designers have embraced the concept of experience (or user experience) as the focus of their design goal, philosophy and even methodology. Experience has been a logical extension beyond usability centred design, where meaning, pleasure and delight were long neglected by researchers and developers. However, even the improved term user-centred design was found to be restrictive – people are more than users, and designers need to make that distinction matter. Designing for experience requires awareness and empathy for sensory experience, emotion and action as well as for the evolving values and meaning in products and their social, material and cultural contexts. Researchers have had to develop new tools and practices for designing for experience (Buchenau and Fulton Suri, 2000; Sanders 2001). Marketing literature was the first to pick up on the importance of this shift in focus (Leonard and Rayport, 1997; Pine and Gilmore, 1998) and to prove the business value of having experience as a design focus.

The success of the concept of product experience has been particularly apparent in the domain of designing interactive products such as websites (see for example, Shedroff, 2001; Garrett, 2002), although consumer products have also been systematically pushed into the realms beyond usability (cf. Jordan, 2000). The same experience boom has also continued to resonate in design research, with much new work on the various aspects that extend traditional approaches towards more all-encompassing and experiential ones. These research directions are often based on an academic discipline; for example, emotions are possibly the largest research area in psychology applied to design research

(especially so in the human–computer interaction field). The complex and holistic nature of experiencing seems to require a broader view than any one academic discipline can support alone. However, different sciences have advantages in different stages of design. Research on emotion has focused more on evaluation of design, whereas social sciences are being adapted to the early, ‘fuzzy front end’ of design in order to understand people and products more holistically.

Each discipline offers a different way of researching and defining experience and a different set of methods and tools for the purpose. However, human experience is elusively large, and cannot fit into the framework of any discipline completely and exhaustively. The approach chosen needs to be selected to fit the needs of the particular project, addressing the available resources, the purpose of the research and the contexts of experiencing where research has to take place. This is frequently where practical experience research and academic experience research part company, as academia has more time and the ability to publish but often a narrow or artificial purpose, whereas a company has a very clear purpose but perpetually suffers from a lack of time and other resources. In our view, the best experience literature has been created where these two worlds meet.

This paper describes our work on the notion of user experience. Essentially, we elaborate the concept by situating it in social interaction. The paper proceeds in three parts. First, we relate our work to other work in this area. After this brief theoretical excursus, we illustrate our work through two examples. The first is more research-focused, intended to illustrate conceptual aspects of our work. The second is more design-oriented, illustrating how sensitivity to social aspects of experience can be taken into account in interpreting user research and integrating it into actual design work.

## 2. INTERPRETATIONS OF USER EXPERIENCE IN DESIGN RESEARCH

Design researchers agree that experiencing is something subjective and private, as pointed out by Buchenau and Fulton Suri (2000) and no one can know exactly what an experience is and feels like for another person. Experiences are also unique, since each moment changes people slightly but irrevocably, making it impossible to repeat the same experience. While people’s perceptions and experiences evolve, the products that are the props and facilitators of experiences generally remain the same, or suffer from age and wear. Three main strategies can be identified for defining the relationship between design and experience, as described in detail by Battarbee (2004). These strategies may be product-focused, human-focused or interaction-focused, each implying a different approach to studying experience. The purpose of specific experience frameworks can be generative as they inform and inspire designers, but such frameworks can also be evaluative, such as the quality of user experience framework (Alben, 1996), which included aspects of the design process in its evaluation, something that end users rarely see or care much about, but which was of interest in that context.

The first and simplest way is to focus on the product as the source and cause of experiences. Such frameworks may be very particular (for example, the information architecture of designing web pages by Garrett, 2002) or broad (all physical products in the ‘scene of experiences’ discussed by Jääskö, Mattelmäki and Ylirisku, 2003).

The second way is to focus on people and their needs and the kinds of experience they have and desire. People have an infinite capacity for experiencing, which products can either support or hinder. People also have universal drives and needs, such as those described by Maslow (comp. Jordan, 2000: Ch. 5). Products satisfy these emotional

needs. Most of these models have a psychological basis, such as needs or emotions (see Desmet, 2002).

The third strategy focuses on experiencing as a process, in some ways a means of integrating both models into a timeline. A process view of the product is exemplified by Rhea's product role life cycle (Rhea, 1992), where products can become increasingly important through events as well as fade into oblivion. Although the product itself does not change, people and the usage context do, and so does the experience. This provides methodological opportunities for taking the process of change into account.

There are a few models or approaches that have been particularly influential in the field of designing for experience. Sanders, who describes experience as a moment of action with reflection on the past and anticipation of the future (Sanders, 2003), suggests using observation for learning about the immediate present, and talking for finding out about the recent past and near future and making, i.e. constructing artifacts of knowledge to address experiences from the past and dreams for the future. Forlizzi and Ford (2000) break down the moment of the experience into various interaction experiences, ranging from subconscious to cognitive to those involving storytelling. Subconscious experiences can only be observed, cognitive ones discussed and analyzed, and storytelling ones obviously unfold as meaning is attributed to the experiences through reflection. Both models show how people make sense of what they do in various ways and on various time scales through different actions, reflecting on the past and anticipating the future.

While none of these models deny the importance of the presence of other people in experiencing, they treat the individual as central and only hint at social contexts by referring to storytelling. We go a step further, claiming that interacting with other people is the basis of making sense of experiences at all. To learn about product experiences, phenomena should not be studied in isolation of sensations, actions and emotions, without which meanings are inert and short-lived, lacking roots, direction and consequences. Observe these in the context of social interaction, however, and the meaning of the experiences will change and evolve in unpredictable yet consistent ways. This aspect of user experiences as social interaction, called co-experiencing (see Battarbee and Koskinen, 2004), treats experiencing as a process that is done by individuals in social interaction – experiencing is still subjective and private but its meanings can be shared and communicated to others either implicitly or explicitly. Although people can and do engage in self-talk and in doing so address themselves as a social object, without interaction with other people there is little reason to seek meaning in experiences or challenge an existing meaning with a new interpretation. Experiences come truly alive in social interaction.

### 3. A PHILOSOPHICAL DETOUR

The principles of the pragmatist philosophy are to observe the world and to focus on its practical matters. This pragmatic principle is not only reserved for the focus of observation, but also to the desired end results. Pragmatic philosophy should respect and build on prior knowledge whenever possible (James, 1995, p. 56). The observations that prompted the search for the definition and concept of co-experience were of children enjoying using devices together more than alone, and coming up with more divergent and creative uses together than alone (see Mäkelä et al., 2000). Making sense of the experience was a fun social thing for them and tied to the meanings and opportunities they discovered through the products. These observations prompted first a search through the growing body of user experience literature, and then a search for a way to learn, describe and communicate the significance of the observation. Several other field studies later, it was clear that

using and exploring together had very different qualities than using alone, and not only for children. Finding out what a device is good for is something that is quite crucial to many design research activities, especially when involved with actual design and product development work.

The solution was to look for a theory that makes sense of meaning-making by individuals in social interaction and is based on observations in natural settings. Blumer's symbolic interactionism is a theory in sociology that focused in the 1930s on the study of interaction between people and brought in field studies as the data collection method of choice (Blumer, 1968). Symbolic interactions are intentional and convey meaning – Blumer leaves out unintentional, unsymbolic ones such as reflexes. For example, a sneeze itself would not be included, but the behaviors of politeness and hygiene associated with sneezing are definitely symbolic, and used to convey meanings to others.

According to Blumer, the basic principles of symbolic interactionism are:

1. That people act towards things (such as physical objects, people as well as abstract ideas) on the basis of meanings they ascribe to them. That is, for one person a chair is for sitting, while for someone else the same chair is a treasured part of a collection of Le Corbusier pieces.
2. These meanings are created in interaction with other people. When a guest informs the unknowing host that the chair is an original Le Corbusier, the host's perception of the chair changes.
3. These meanings are handled in and modified through an interpretive process with things people encounter. When the proud host tells other visitors that the chair is a Le Corbusier, and gets compliments and hears stories about its value, he learns to appreciate the chair more. However, if another visitor points out a detail in the materials that reveals that the chair is merely a beautiful copy, the host now has to find a way to deal with the new situation and the types of disappointment – both with the chair itself and with all the people who have been part of the real vs. copy experience.

To interpret Blumer in terms of user experiences, there are two stages of processing an experience. One is the internal senses and feelings, and the other is deciding what they mean and how to relate to them. For example, to be able to interact with others successfully, ambiguous emotions are observed, regulated and shaped through social reflection processes that focus on the self (Rosenberg, 1990). Then, consciously or not, emotions are expressed through sentic modulation through culturally and personally determined gestures and behaviors (Picard, 1997, p. 25). In addition to the inner emotions, any message that people communicate to others comes accompanied by a host of supporting clues and behaviors that aim to direct others to understand the person in the intended way (Manning, 1992). Thus, through our behavior and by observing the meaning-rich behaviors of others, we quickly learn about the do's and don't's of the world. This is not to say that the end result is a consensus. Rather, the importance of this model is that although prior meanings exist, these are open to reinterpretation by anyone at any time in a continuing negotiation process. Any significant change in the situation, environment or activity prompts a re-evaluation of the meanings that people entertain.

Blumer's symbolic interactionism makes use of sensitizing concepts, which act as a scaffold for constructing understanding but, like a scaffold, are not a part of the final structure and are taken down before construction is complete. A sensitizing concept orients and supports observation and interpretation activities without dictating the end result. Co-experience is offered as such a sensitizing concept. Using the concept of co-experience can help to set up observations and identify interpretations in findings, especially when the focus is broad and fuzzy, as in the early stages of product design.

## 4. CO-EXPERIENCING MOBILE MULTIMEDIA AS A PROCESS

Co-experiencing is the process of learning, maintaining and modifying meaning in social interaction. This happens through all that people do or fail to do, non-verbal and verbal communications and behavior. Co-experiencing consists of three key processes, or types: lifting up, reciprocating and rejecting. Each is discussed here to show how social interactions are crucial in the emergence and shaping of experiences with and concerning products and how these three types of action are all a necessary part of the process of co-experiencing.

Implicit in this analysis is that interaction is a process that generally proceeds in a turn-wise fashion. Turns are easy to identify in a conversation between two people, but may be more difficult when observing how a group of people navigate across a crowded building. Further, the turns may be hard to spot in casual everyday exchanges, because much of everyday interaction is geared towards proceeding according to shared expectations. At the same time, best friends and total strangers share the fact that for opposite reasons they have the broadest range of choice in how they act towards one another and what meanings they choose to convey. Strangers have nothing to lose and thus have more latitude, whereas friends have come to trust each other over time and may have developed their own style of humor and their own expectations of appropriateness, which may exceed common norms and customs.

However, the key is that whether people come to define something (i.e. a product experience) as good or bad, or 'for me' or 'not for me', depends on these processes of interaction. Experiences change, evolve, fluctuate and grow in social interaction, and people are also quick to learn and observe from the experiences of others. Social interaction lifts things out of fluent, ordinary experience, keeps them as focal points of experience, and then removes them from common focus. Social interaction largely explains how things migrate between the levels of experience described by Forlizzi and Ford (2000).

### 4.1. Lifting up

How is it that people move from a state of just doing and being to a state of reflecting and describing what they are doing or have done? How is the ongoing flow of doing and responding crafted into a meaningful, describable message? The argument here is that this process of lifting up happens in social interaction, since people find occasion through encountering others to inspect their experiences and tell them about their experiences.

How does lifting up happen? People communicate many things at once even in the simplest, smallest gestures and exchanges. Social interaction is built on turns and turn taking, which builds on what was said and done before, following loose rules of maintaining topic and relevance to the previous turn. The initial emotional response is usually only a trigger, and the actual story is told so as to interpret the situation or event appropriately for the recipient. The sociologist Erving Goffman refers to this as 'impression management' (Goffman, 1958).

For example, in Figure 19.1, Maria has just taken a picture of herself with her camera phone, and sends it to Liisa, her friend. Her pose is nondescript, a point she elaborates in the text. We can interpret this message to mean that she labels her mood as boredom as she shares it with a friend. More importantly, she also turns expressing mood into a possible topic of discussion as she lifts her own experience up to Liisa.

Breakdowns and surprises are what make good stories for people to share easily with designers (Erickson, 1995). At the lower level, some emotional responses can be extremely fleeting; for example, certain facial expressions may be as short as 125 milliseconds (Hatfield, Cacioppo and Rapson, 1994, p. 19). At a higher level, the changes in reporting



**FIGURE 19.1** A picture of mood.



**FIGURE 19.2** Replying to the picture of mood.

or communicating emotions can become more intentional: something frustrating may be used humorously to entertain others or may be communicated to seek attention and sympathy. In other words, people interpret and communicate their emotions in ways that offer a desired picture of self to others, and that offer other people desired ways to respond. There are two kinds of response that either align with or challenge the interpretations offered or desirable behaviors. For co-experience, we look at the extreme ends of these responses as reciprocating and rejecting the interpretation.

## 4.2. Reciprocating

Individual things and events are constantly lifted up to shared attention without any long-lasting impact. If we want to talk about co-experience properly, we need to focus on those things that are focused on in interaction. We call this process reciprocation. Reciprocation is a positive response to something that has been lifted up. The socially expected norm is to respond to a gesture with a like gesture, to acknowledge, or even replicate the type of experience or thought another person has offered. Reciprocating not only aligns with the interpretation offered but also responds with a similar one. Many ritualistic interactions, such as those depending on the concept of gift giving, centre on reciprocity, but are apparent in any small greetings and favors as well (see Taylor and Harper, 2002).

In talking about product experiences, people often find a story to tell that relates to a similar kind of experience or similar interpretation, a ‘that reminds me of’ type of story. In product experiences, reciprocation also builds on the work of others. One person may experiment with a product and come up with a clever use – someone else may accept this, take the idea and modify it even further, accepting and taking the idea as their own. The process is a creative one.

Figure 19.2 gives Liisa’s response to Maria’s message displayed in Figure 19.1. She responds to Maria with another gloomy face and a rhetorical question that shows that she is perhaps not in the best of moods either. However, she also manages to do several

things in her message. For instance, her response has a humorous, personal tone, which suggests that Maria's previous message was not that serious, or that it should lighten up a little. Thus, her message is a response, but it does many other things as well. Of course, this is Blumer's point: in interaction, experiences are taken up, twisted, interpreted, and recast in many ways, none of which are final or conclusive and which can be only judged against the responses and interpretations they invite from others. The process is not mechanical, but dependent on the participants' wit in doing things.

Especially in the case of technology that facilitates communication, the need for reciprocating in social interaction blends seamlessly with the search for the meaning and purpose of technology. This is very clear in communication technologies and products, which are both part of your surroundings but also facilitate interaction with others further away (see for example, Battarbee and Koskinen, 2004).

When a product or technology allows or even encourages reciprocation, it creates an instant platform that allows people to explore its meaning together. In this sense, reciprocation is the key element in co-experiencing. Reciprocation is also something that allows feelings of intimacy and closeness to be expressed and shared, with or without products involved (Battarbee et al., 2002). Things that might discourage reciprocation are sometimes subtle: a cost that is perceived to be too high, a task sequence that requires too much time and attention or any other failure along the way, such as delivery or connectivity that is unreliable or of unacceptably poor quality. Plain usability problems can also stump co-experiencing. The hindrances may also be of social quality, a perceived mismatch between the relationship and communication purposes and the perception of what the technology or device is good for. However, the search for what a technology is good for is an ongoing process, not a static state or a clearly definable time span. As the study by Muller et al. (2003) of a communication product (instant messenger) shows, people's usage patterns, the number of people they connect with and the purposes of use grew and broadened over the study period of two years, which is much longer than most design studies would ever last. However, while reciprocation is generally a positive force in co-experiencing, people may also amplify each others' negative interpretations, creating a vicious circle in which they reinforce each others' negative observations and judgments of a technology or an experience. The way a product or an experience falls out of grace within a group of people may be surprisingly quick and catastrophic.

### 4.3. Rejecting

Experiences do not remain in joint attention forever. Most are simply passing moments in the stream of life. There are many reasons for this. Experiences are sometimes bound to events that have a natural end, while at other times they may fade because other things show up that capture the participants' imagination. In most cases, co-experiences have a short lifespan simply because people return to things they were doing previously. However, occasionally things get more complicated, and people have to actively choose to end something that otherwise will not stop or that is no longer desirable. For example, behavior and interpretation may go beyond the bounds of propriety, and the experience has to be actively rejected.

We have studied two types of rejection in our work. There is passive rejection, in which case a possible line of interpretation is ignored in favor of another. Then there is active rejection, in which people indicate to others, subtly and implicitly or bluntly and explicitly, that they do not like or approve of their interpretations and actions.

The problem is that active rejection is always a loss of face in interaction that requires a repair action in order to restore the situation, even if the chiding or rejection is gentle.

Maintaining face (as discussed extensively by Goffman, 1967) is a key motivator for everyday social interaction, which is always a fine balance between keeping interactions pleasantly predictable and asserting self for personal gain at the expense of the interaction. As Goffman also mentions, the severity of the loss of face depends on the social situation and the ability of people to deal with the break – the problem with these situations is that people do not know how to behave and feel awkward, embarrassed or angry. Goffman describes many tactics that people employ to deal with this, ranging from ignoring the situation to exclaiming ‘oops’, apologizing, making fun of themselves before others can, drawing attention away from the problem to something else, or when all else fails, cutting their losses by ending the interaction and breaking up the situations by changing the focus onto actually dealing with the cause of the disruption.

Each product and new technology has to adapt and find its accepted uses and behaviors. It is worth noting that all the publications and announcements of mobile phone etiquette were and are geared towards encouraging politeness to those in the vicinity of the user of the phone. People had to learn through trial and error when it is acceptable to receive or make a call and how one should excuse oneself from others, and sometimes made these rules explicit for all. In a meeting space at IDEO, the rules of brainstorming are posted in beautiful lettering on the wall. An extra rule, ‘No cellphones’, has been posted with a marker on a sticky note. Similar messages can be found in restaurants, cinemas, meeting spaces and hospitals. Communities find ways to deal with new challenges through trial and error.

The particular processes of co-experiencing can be revealed and understood by observing how people lift up, reciprocate and reject experiences with each other, and by empathically understanding what and why they do so. In many cases, however, organizing such observations is not straightforwardly easy – observing social interaction requires analytical skill and observational tact, and co-experience prototyping requires technologically advanced prototyping or clever use of analogous experiences and products.

## 5. MORPHOME: DESIGNING FOR CO-EXPERIENCE WITH PROTOTYPES

The primary reason for coining the term co-experience instead of preferring longer and more precise expressions is to provide designers with a convenient shorthand for paying attention to the social context of experience as they interpret what they learn and see. Our methodological proposal rests on Buchenau and Fulton Suri’s notion of experience prototype (2000), but elaborates particular aspects. In designing with co-experience in mind, following a few principles is more important than developing for a highly sophisticated functioning prototype to represent the product experience. The following paradigm describes the conditions required for studying social interaction for the purposes of design (Battarbee, 2004; Kurvinen, Koskinen and Battarbee, 2006).

- **Ordinary social setting.** More than one person has to be involved to create the conditions for social interaction, which has to take place in a real context, not in a studio or a laboratory.
- **Naturalistic research design and methods.** The research setting has to be naturalistic: people have to be able to author their own experiences to allow for creativity. Data from people must be gathered and treated using empirical and up-to-date research methods, and requires that several methods or tools be used in parallel, because the complexity of experiencing cannot be captured by one method alone.
- **Openness.** Research design has to be open: the prototype should not be thought of as a laboratory experiment, but rather as an intervention. The designer’s task is to



observe and interpret how people use, explore and create experiences with the prototype, which is still undefined to its new users and contains many possible meanings and interpretations.

- **A sufficient time span.** The prototype usage ought to be observed for long enough, typically for a few weeks at least since it is difficult to get an idea of how people explore and redefine the technology in their actions where the study period is shorter. The usage time needs to reflect frequency of use and social interaction.

- **The sequential unfolding of events.** Designers have to pay special attention to how events unfold over time and in context, and what may hinder or enable people's ability to co-experience.

The intention of this setup is to create conditions in which a social organization involving the representation (i.e. co-experience prototype) emerges, so that this organization (i.e. meanings that are interpreted from interactions with the prototype) can be observed and described in detail. This understanding can be used as a driver in design, and may even be modeled. The key thing in creating a research design for prototyping co-experience is that people must have time and opportunity to create meanings to prototypes together with other people, i.e. to lift these things into attention and then let attention wane (Sengers and Gaver, 2006).

The next section shows that it can in fact be relatively easy to build prototypes, even of future technological visions and situate them in a social setting to see what courses they may come to follow in that setting. These examples show that people pay attention to new things in their environment and elaborate their experiences with them with other people. That is, using co-experiencing terms, they lift things to each others' attention, reciprocate these experiences, and may even come to contest them under certain circumstances.

The following section is based on a study called *Morphome*, which focused on so-called proactive information technology in the home. In a nutshell, proactive technology is ambient technology that gathers data from people using sensors, and uses this data to react to events pre-emptively or in any case faster than a human could or would, thus doing things for people in a proactive fashion (Tennenhouse, 2000). Proactive technology suggests the promise of creating a calm future environment in which people do not have to continuously give commands to electronic devices (Want, Pering and Tennenhouse, 2003; Weiser and Seely Brown, 2004). In *Morphome*, several different types of prototype were used to study the interaction and design issues of proactive technology in the home, with each turn experimenting with prototypes, collecting and interpreting qualitative data (see Seale, 1999) and developing better hypotheses for design. It is important to keep in mind that the study was not about testing ideas with data, but rather about designing representations to be used as social interventions in the highly sensitive home environment to learn about co-experiences with the prototypes and thus to inform the design of the next set of prototypes.

The perspective of the research matters more than actual methods or theoretical assumptions. In industrial work, in which it is not usually possible to spend months on gathering and analyzing data, researchers may have to rely on 'discount' methodologies and streamlined or abbreviated studies. In *Morphome*, we installed our prototypes in real homes using the paradigm described above, but gathered participants' experiences in interviews and scenario-assisted interviews rather than using ethnomethodological or even ethnographic methods. The aim is not to argue that co-experience must be studied with any particular methodology, since methods of study need to be adapted to the situation in hand. The importance lies in creating the right conditions for co-experiencing to happen.

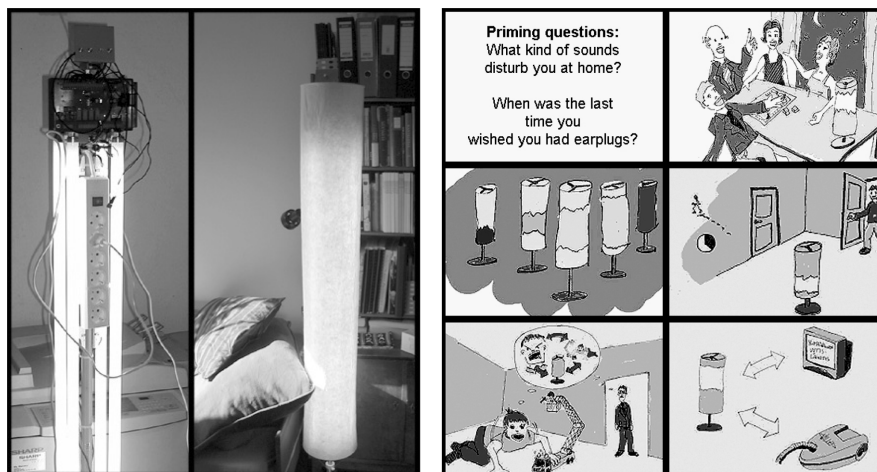
### 5.1. Design prototype: The 'IKEA' style study and system scenarios

The 'IKEA' style study was conducted by placing a design prototype in the home context for a period of time. The prototype was an IKEA-esque lamp that reacted to sound levels, and thus to particular actions and behaviors of people in the home. The lamp had four 36 watt light tubes (two colored, two normal) and four states: a normal lamp with button for adjusting light; a 10-minute cycle in which colors changed from warm to cold; a sensor designed to keep light constant in the lamp's surroundings, and a state in which red and blue LEDs reacted to sounds. It was also possible to attach other electrical devices to the lamp. The design was deliberately simple in technical terms since the aim was only to provide people with the experience of what living with proactive technology might be like. The logic is that the design would thus be unremarkable enough for people to focus their attention on the behavior of the lamp instead of thinking about it as an artistic object (Figure 19.3).

The prototype functioned as it was designed to do. However, since our technology was simple in comparison to Tennenhouse's vision of proactive technology, we took the participants' experience with the lamp only as a starting point, and enriched the study with scenario interviews (see Carroll, 2000) in which we probed both technology and social action in more detail. In these scenarios, the experience of participants with the lamp was situated in various technological and use situations.

As expected, people were willing to delegate some of their 'dirty work' to the lamp installed in the network, and let it automatically control some functions. People related some of their real life experiences to the system concepts, suggesting for example that a vacuum cleaner should power down when the phone rings. The design prototype of the lamp did not contribute in an identifiable way to the participant's ability to evaluate the scenarios and build on them.

However, the situation changed as we started to explore how proactive technology would affect social affairs. For example, we asked whether the lamp would be an appropriate feedback mechanism about sound level, whether its behavior should change in the course of the day, and what kind of feedback it could give people about sound. In this



**FIGURE 19.3** Left: The IKEA Lamp Design: electronics and its states. The UI is the upper part of the picture on the left. Right: Examples from scenarios. Up: the priming question sent a week earlier, the sound world of the home (preparatory question); Middle: the lamp reacting to sound, *Memory Trace* (a lamp that remembered who had been in the room, and communicated that to newcomers); Down: the lamp in social context, the lamp as a control for other technology. Scenarios drawn by Kristo Kuusela.

case the experiences with the lamp in the home had already provided some co-experience opportunities and participants were able to judge both positive and negative repercussions.

In particular, people thought it would be a nice, playful addition to the home in situations like entertaining guests. However, when we probed what people would think about a lamp that had a *Memory Trace*, a function which dimmed the light (the warm chair effect) and whether they would allow it to be linked to a home-wide network, people became reserved, the particular issue being privacy. We originally explored the idea whether the lamp could sense the presence and absence of people, and communicate by, for instance, getting increasingly dim over time when no one was present. However, people thought that this solution would simply translate into a form of surveillance technology. They also were worried about how neighbors and criminals would use cues from the lamp for the wrong purposes.

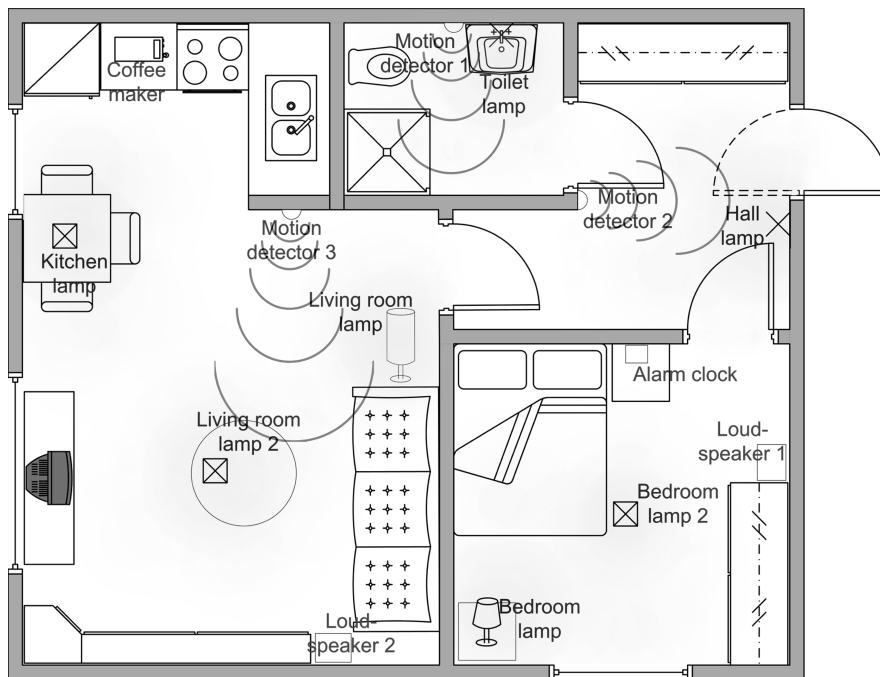
In brief, when we raised social issues into the discussion using our scenarios, people felt that they were important in whether they would accept technology or not. These scenarios certainly indicate that reasoning about social affairs does enter into discussions of proactive technology. This social reasoning has both positive and negative aspects. That is, even if we cannot predict exactly how people might experience proactive technology, our interviews show that we cannot neglect social aspects of experience – co-experience in our terminology – in designing proactive systems. People saw proactive technology in social terms, sometimes in terms of real, sometimes imaginary meanings. Some things they see as interesting in individual terms may seem less desirable when they think about them in a social context, and vice versa, illustrating the complexity of the home environment. As designers, we should pay attention to ways in which social meanings affect how things are lifted to attention, and what kinds of terms are used in this process.

## 5.2. The system prototype: Living inside a proactive home as co-experience

Just how important co-experience may be in designing proactive systems is well illustrated in the third phase study of the system prototype. The participating homes were fitted with sensors and programmable behaviors using the X10 home automation system ([www.x10.com](http://www.x10.com)), which uses existing electrical cables for communication between devices. The software was replaced by flexible open source software called Misterhouse (MH; [www.misterhouse.net](http://www.misterhouse.net)). MH combines the X10 hardware with a PC and offers a simple user interface as well as some basic means for programming and essential object libraries. The logic of events and functions was programmed in Perl. The X10/Misterhouse study probed what it might be like to live in an environment that has proactive features. Figure 19.4 shows how lamps, the sound environment and coffee makers were linked to each other in one case (details of the floor plan were changed at the request of the participant).

In X10/Misterhouse, we went beyond just having a collection of the IKEA lamp style individual devices, and tried to convey the feeling of what it would be like to live in a system in which objects communicate with each other. To that end, we built experience prototypes (Buchenau and Fulton Suri, 2000) for two activities, waking up and going to sleep, and tried to program them into the system. Table 19.1 shows how our prototype modeled the waking up behavior of a proactive system.

In interviews conducted after a two-week field period, participants confirmed that the routine had worked well. The key factor was that the process of waking up in most cases has a clear and unambiguous starting point, the alarm, which, furthermore, is easy to attach to a more encompassing electronic system. In terms of collective and individual variation, waking up is a far simpler and more repetitive routine than going to sleep, and in consequence is relatively easy to model. The system and ordinary practices were in far better correspondence with each other.



**FIGURE 19.4** An example of a floor plan showing the placement of devices connected to the proactive home system. The operational elements are named in the floor plan.

**TABLE 19.1** The operation of the wake-up routine in each state is explained

State	Function
Wake-up activated	The wake-up time has to be programmed prior to entering the state. The wake-up routine is ready to be started as the time condition is filled.
Preliminary state	The wake-up routine will start as the state is being entered. The bedroom lamp and the living room lamp brighten linearly for 15 minutes up to 50% of the maximum. Ambient sound is played in the bedroom and in the living room. The volume is first low, but slowly increases up to 50% of maximum.
Running state	The coffee-maker is switched on. The lighting of the bedroom and the living room, and the sound volume are further increased up to the maximum level.
Fading state	The lighting power of the bedroom and the living room lamps, and the sound volume level are decreased slowly.
Snoozing state	When this state is being entered, lights and sound fade. When the program jumps to the beginning of the wake up routine, and lighting and sound volume levels are increased. The snoozing state is on until the snoozing timer is expired.
Wake-up deactivated	The bedroom and the living room lamps, the coffee-maker, and all sounds are switched off.

The second system modeled (Table 19.2) was to support going to sleep by proceeding to dim the lights slowly and create a soothing sound world, offering a convenient environment for going to sleep. This proved far more difficult to program for two reasons. Unlike waking up, going to bed and falling asleep does not have a clear-cut starting point. There is also tremendous variation in this sequence, not just between homes, but also from one evening to the next. Even though this system for falling asleep worked out

**TABLE 19.2 The operation of the going to sleep routine**

State	Function
Sleep activated	The sleep time has to be programmed prior entering the state. The sleep routine is ready to be started as the time condition is filled.
Preliminary state	The going to sleep routine will start as the state is being entered. The bedroom lamp and the living room lamp are turned on at the beginning (in the case they are not already on) and they are dimmed linearly for 15 minutes to 50% of the maximum lighting power. Ambient sound (sea, waves) is played in the bedroom and in the living room. The sound volume level is higher at the beginning, but is slowly decreased to 50% of the maximum.
Running state	The lighting power of the bedroom and the living room lamps and the sound volume are further dropped to the minimum level.
Sleep deactivated	The bedroom and the living room lamps and all sounds are switched off.

fine for individuals, the real complications followed from co-experience. How should we take complexities in social action into account; for example, the fact that people seldom act as a team, more often pursuing several activities in the same space, exhibiting various degrees of involvement with each others' ongoing agendas?

When people reflected on the social aspects of their experience with the prototype, they were able to formulate their experience in terms of rejection. Thus, in an interview, Vera, a participant, described the system as patronizing. Once such feeling was expressed and generalized in Vera's family, and the system lost a good deal of its initial appeal: this procedure for falling asleep was in fact rejected in all the homes.

The line between patronizing was crossed (laughs). I don't want a system to tell me when I must go to bed. I know when I want to do that. The function that reminded me about it was unnecessary. (Vera, June 2005)

In consequence of opinions like these, always reciprocated in our family interviews, the going to sleep sequence was largely rejected. Although the idea of a proactive system aroused interest and did not scare people once they became familiar with the X10/Misterhouse installation, this particular sequence was rejected unanimously. The contrast with waking up, an activity that has a far clearer sequential structure, was clear. Although similar indications could have been achieved in scenario interviews, the definiteness of the rejection was unmistakable once it had been co-experienced.

Again, when we studied our experience prototype of a proactive system in terms of co-experience, we saw how it colored the way in which people relate to that technology. In reflecting their experience, people thought about it not just from their own, personal experience, but also in terms of how it would affect other people and joint action. When we used co-experience as a sensitizing term in our analysis, we had to pay serious attention to many problems inherent in proactive technology, ranging from simple things like people having different bed-times to more complex ones, like people thinking they have a right to decide for themselves what they want to do without technological interference.

## 6. DISCUSSION

Throughout our work, we have taken it as an axiom that experience takes place in a social setting. We have coined the term 'co-experience' as a convenient shorthand for

this feature. In theoretical terms, this term is an elaboration of the user experience model introduced by Forlizzi and Ford (2000), which is mainly indebted to the pragmatic philosophy of John Dewey (1934). However, since our aim has been to push the social grounds of experience to the forefront, we have built primarily on Herbert Blumer's thinking (1968) in our attempt to understand co-experience as social action.

Shifting attention to the social grounds of experience has an additional methodological benefit. Unlike cognitive states, social action is directly observable. It can be studied by simple means without recourse to complex, contested theories of, say, how the brain functions or wearable technological devices for measuring and monitoring the body's various states.

As to the methodological aspects of our work, we are not promoting a major change in prototyping practices, but calling for a research paradigm (in Robert Merton's 1968 sense) in design that differs from the experimental line that dominates in usability research and in studies of user experience. The three main differences are:

1. First, there has to be a theoretical framework that sensitizes the designers to how this social organization takes shape, and how it affects the way in which people experience designs. Although our work builds on symbolic interactionism (Blumer, 1968), other options for a theoretical foundation exist. One such is the well tried-out ethnomethodological and activity theoretical work in Computer Supported Collaborative Work (CSCW) (see e.g. Nardi, 1997; for a more elaborate statement, see Kurvinen, Koskinen and Battarbee, 2006). The primary reason for having such a framework is that existing models of user experience do not prepare us well to see social organizations and processes, and few designers are trained even in elementary sociology.

2. The main features of research design have to make sure that there is social action to be observed. In creating prototypes, attention has to be paid to social aspects of experience. Prototypes must be considered in the context of a natural social organization that has to have time to evolve through opportunities for social interaction and communication over enough time to get through the 'honeymoon' phase of initial excitement.

3. Finally, there has to be an interpretive procedure for making sense of data. The main aim is not to 'test' whether the designers' ideas about the design were right or wrong, but to install the design into a real world, and then see what happens to it, how people make sense of it, and how people make sense of their experience of it in interaction with others. More specifically, designers need to understand what kinds of thing people lift up from their experience to be reciprocated in discourse, and how they come to elaborate and modify these meanings in the course of interaction.

Instead of treating social action as just an additional variable in models of user experience, we propose to take it as the starting point of exploration, and study co-experience with prototypes first, and individual variations second.

It is important to note that we do not say that designers ought to follow one particular framework or methodology in studying co-experience, since one can use any number of design methodologies to do so. Similarly, one can rely on various frameworks for understanding it. The most important thing is that there be a sensitizing framework that helps designers in making sense of the intricacies of interaction and what it does to experience, and methodology that supports this study. For instance, in our own work, we have been relying on two theoretical frameworks, symbolic interactionism (see Battarbee 2004) and conversation analysis (Koskinen and Kurvinen, 2005; Kurvinen, 2007). In methodological terms, we have been gathering actual multimedia messages, but we have also been using interviews in our studies. In our work, however, we have always had a prototype that has been placed in a social setting. The analysis has consistently focused on social action and how it takes shape in the context created by the prototype.

The value of the Morphome project studies is that it is possible to conduct a discount version of co-experience. Ideally, at least from an academic point of view, the study of co-experience requires very detailed data on how people interact with each other in the context created by the prototype. This was the case with our study of mobile multimedia, in which we were able to collect actual messages as they were sent by 25 users (see Battarbee and Koskinen, 2004; Battarbee, 2004). The mobile multimedia study could have been more in-depth had it been supported by observations in the field or follow-up interviews, but the data itself creates substantial data on the context and people's relationships. Similarly, in an ideal situation, the analysis of this data follows well-trying scientific protocols. For example, the mobile multimedia data has been analyzed from an ethnomethodological perspective (see Koskinen and Kurvinen, 2005).

Finally, our point is conceptual, aimed at advancing a shift in design thinking rather than suggesting something totally new for the most advanced design practice. The leaders in design research (see Sengers and Gaver, 2006) as well as leading design companies (see Buchenau and Fulton Suri, 2000) follow a research paradigm that is much the same as the one described in this chapter. The approach advocated by us can easily be adapted to researching, say, interaction with robots or intelligent textiles. If for practical reasons one can do only one prototype, then it is wise to conduct research early on in the design process when design drivers are still open. However, as our examples have shown, research can be conducted at considerably later stages of the design process as well: in our study, the notion informed all stages of our iterative research. In the final analysis, the purpose of paying attention to co-experience is not so much about saying what the future product or system should be like in its details. Rather, it is about providing a more sensitive description of the social phenomena to inform designing technology.

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## REFERENCES

- Alben, L. (1996, May/June). Quality of experience. Defining the criteria for effective interaction design. *Interactions* 3(3), 11–15.
- Battarbee, K. (2004). *Co-Experience. Understanding user experiences in social interaction*. Helsinki: University of Art and Design Helsinki.
- Battarbee, K. and Koskinen I. (2004). Co-Experience: User experience as interaction. *Co-design*, 1, 5–18.
- Battarbee, K., Baerten, N., Hinfelaar, M., et al. (2002). Pools and satellites – intimacy in the city. *Proceedings of Designing Information Systems DIS'00*, pp. 237–245. New York: ACM Press.
- Blumer, H. (1968). *Symbolic interactionism. Perspective and method*. Berkeley: University of California Press.
- Buchenau, M. and Fulton Suri, J. (2000). Experience prototyping. *Proceedings of Designing Information Systems DIS'00*, pp. 424–433. New York: ACM Press.
- Carroll, J. (2000). *Making use. Scenario-based design of human-computer interactions*. Cambridge, MA: MIT Press.
- Desmet, P. M. A. (2002). *Designing emotions*. Delft: Technical University of Delft.
- Dewey, J. (1934). *Art as experience*. New York: Pedigree.

- Erickson, T. (1995). Notes on design practice: Stories and prototypes as catalysts for communication. In: J. Carroll (Ed.) *Scenario-based design. Envisioning work and technology in system development*, pp. 37–58. New York: Wiley.
- Forlizzi, J. and Ford, S. (2000). The building blocks of experience. An early framework for interaction designers. *Proceedings of Designing Information Systems DIS'00*, pp. 419–423. New York: ACM Press.
- Garrett, J. J. (2002). *The elements of user experience. User-centered design for the web*. New York: AIGA and Pearson.
- Goffman, E. (1958). *The presentation of self in everyday life*. London: Penguin.
- Goffman, E. (1967). *Interaction ritual*. New York: Pantheon Books.
- Hatfield, E., Cacioppo, J. T. and Rapson, R. L. (1994). *Emotional contagion*. Cambridge, MA: Cambridge University Press.
- James, W. (1907/1995). Pragmatism. In: R. B. Goodman (Ed.) *Pragmatism – a contemporary reader*, pp. 54–75. New York: Routledge.
- Jordan, P. (2000). *Designing pleasurable products*. London: Taylor and Francis.
- Jääskö, V., Mattelmäki, T. and Ylirisku, S. (2003). The scene of experiences. In: *The good, the bad and the irrelevant: the user and future of information and communication technologies. COST269 conference proceedings*, pp. 341–345. Helsinki: COST and Medialab UIAH.
- Koskinen, I. and Kurvinen, E. (2005). Mobile multimedia and users: The domestication of mobile multimedia. *Telektronikk*, 101(3–4), 60–68.
- Kurvinen, E., Koskinen, I. and Battarbee, K. (2006). Prototyping social interaction. *Design issues* (submitted for publication). [AU1]
- Kurvinen, E. (2007). *Prototyping social action*. Helsinki: University of Art and Design Helsinki.
- Leonard, D. and Rayport, J. E. (1997). Spark innovation through empathic design. *Harvard Business Review*, 75(6), 102–113.
- Manning, P. (1992). *Erving Goffman and modern sociology*. Palo Alto, CA: Stanford University Press.
- Muller, M., Raven, M. E., Kogan, S., Millen, D. R. and Carey, K. (2003). Introducing chat into business organizations: Toward an instant messaging maturity model. *Proceedings of GROUP'03*, pp. 50–57. New York: ACM Press.
- Mäkelä, A., Giller, V., Tscheligi, M. and Sefelin, R. (2000). Joking, storytelling, artsharing, expressing affection: A field trial of how children and their social network communicate with digital images in leisure time. *Proceedings of Computer–Human Interaction CHI'00: Human factors in computing systems*, pp. 548–555. New York: ACM Press.
- Nardi, B. (1997). The use of ethnographic methods in design and evaluation. In: M. G. Helander, T. K. Landauer and P. V. Prabhu (Eds.) *Handbook of human–computer interaction II*, pp. 361–366. Amsterdam, The Netherlands: Elsevier Science.
- Picard, R. (1997). *Affective computing*. Cambridge, MA: MIT Press.
- Pine, B. J. II and Gilmore, J. H. (1998, July/August). Welcome to the Experience Economy. *Harvard Business Review*, 97–105.
- Rhea, D. K. (1992). A new perspective on design. Focusing on customer experience. *Design Management Journal*, 3(4), 40–48.
- Rosenberg, M. (1990). Reflexivity and Emotions. *Social Psychology Quarterly*, 53, 3–12.
- Sanders, E. B-N. (2001). Virtuosos of the experience domain. *Proceedings of the 2001 IDSA Education Conference*. Retrieved 7 November 2006 from <http://www.maketools.com>
- Sanders, E. B-N. (2003). Design for Experiencing: Scaffolds in communicational spaces. *Design for communicational spaces conference proceedings*. Retrieved 19 January 2004 from <http://www.ualberta.ca/COMSPACE/coneng/html/papers/Sanders.doc>
- Seale, C. (1999). *The quality of qualitative data*. London: Sage.
- Sengers, P. and Gaver W. (2006). Staying open to interpretation: Engaging multiple meanings in design and evaluation. *Proceedings of Designing Information Systems DIS'06*, pp. 99–108. New York: ACM Press.
- Shedroff, N. (2001). *Experience design*. Berkeley, CA: New Riders Publishing.
- Taylor, A. S. and Harper, R. (2002). Age-old practices in the ‘New World’: A study of gift-giving between teenage mobile phone users. *Proceedings of Computer–Human Interaction CHI02*, pp. 439–446. New York: ACM Press.
- Tennenhouse, D. (2000). Proactive computing. *Communications of the ACM*, 43(5), 43–50.
- Want, R., Pering, T. and Tennenhouse, D. (2003). Comparing autonomic and proactive computing. *IBM Systems Journal*, 42(1), 129–135.
- Weiser, M. and Seely Brown, J. (2004). The coming age of calm technology. *PhysComp Notes: Working notes on physical computing and embedded networking, Feb. 04, 2004*. Retrieved 17 February 2005, from <http://stage.itp.tsoa.nyu.edu/~tigoe/pcomp/blog/archives/000373.shtml>.



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