

Performing Perception—Staging Aesthetics of Interaction

PETER DALSGAARD and LONE KOEFOED HANSEN
University of Aarhus

In interaction design for experience-oriented uses of technology, a central facet of aesthetics of interaction is rooted in the user's experience of herself "performing her perception." By drawing on performance (theater) theory, phenomenology and sociology and with references to recent HCI-work on the relation between the system and the performer/user and the spectator's relation to this dynamic, we show how the user is simultaneously operator, performer and spectator when interacting. By engaging with the system, she continuously acts out these three roles and her awareness of them is crucial in her experience. We argue that this 3-in-1 is always already shaping the user's understanding and perception of her interaction as it is staged through her experience of the object's form and expression. Through examples ranging from everyday technologies utilizing performances of interaction to spatial contemporary artworks, digital as well as analogue, we address the notion of the performative spectator and the spectating performer. We demonstrate how perception is also performative and how focus on this aspect seems to be crucial when designing experience-oriented products, systems and services.

13

Categories and Subject Descriptors: H.1.2 [**Models and Principles**]: User/Machine Systems—*Human factors*; H.5.2 [**Information Interfaces and Presentation**]: User Interfaces—*Theory and methods*; J.5 [**Computer Applications**]: Arts and Humanities—*Performing arts (e.g., dance, music)*

General Terms: Design, Human Factors, Theory

Additional Key Words and Phrases: Aesthetics, interaction design, human-computer interaction, art, performance theory, experience design

ACM Reference Format:

Dalsgaard, P. and Hansen, L. K. 2008. Performing perception—staging aesthetics of interaction. *ACM Trans. Comput.-Hum. Interact.*, 15, 3, Article 13 (November 2008), 33 pages. DOI 10.1145/1453152.1453156 <http://doi.acm.org/10.1145/1453152.1453156>

Authors' addresses: P. Dalsgaard, University of Aarhus, Helsingforsgade 14, Bldg. 5347, Room 139, DK – 8200 Aarhus N, Denmark; email: pdal@imv.au.dk; L. K. Hansen, University of Aarhus, Bygning 1580, Langelandsgade 139, Bldg. 1580, Room 120, DK – 8000 Aarhus C, Denmark; e-mail: koefod@hum.au.dk.

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or direct commercial advantage and that copies show this notice on the first page or initial screen of a display along with the full citation. Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, to republish, to post on servers, to redistribute to lists, or to use any component of this work in other works requires prior specific permission and/or a fee. Permissions may be requested from Publications Dept., ACM, Inc., 2 Penn Plaza, Suite 701, New York, NY 10121-0701 USA, fax +1 (212) 869-0481, or permissions@acm.org. © 2008 ACM 1073-0616/2008/11-ART13 \$5.00 DOI 10.1145/1453152.1453156 <http://doi.acm.org/10.1145/1453152.1453156>

1. INTRODUCTION

In what used to be a church in a park in London, a man is walking on water. Slowly, he progresses into the huge basin, concentrating on watching his steps. If he falls or misses his steps, he will not be hurt, but he will get soaked. We are watching an interactive installation called *Bridge* [Cross 2006] by Michael Cross (Figure 1) comprised of submerged mechanical steps that raises by the weight of the man.

We are witnessing a man experiencing what it feels like to walk “as if walking on water, eventually reaching the middle of the lake, thirty steps and twelve meters from the deck. There they will stand alone and detached, stranded in the middle of a plane of water” [Cross 2006]. He is not all by himself, though. A guide or guard is walking in the water pool just next to him, and on the deck leading to the pool, several people are awaiting their turn (Figure 2). As this man reaches the end of the steps, he turns around and walks back on the now raised steps towards the deck. When he steps out of the pool, the people awaiting their turn applaud him.

Bridge is an exemplary case of how participating in an interactive experience is more than just being there for the thrill and the enjoyment of it. It is more than what happens between the user and the system, it is more than what happens as a consequence of the user’s actions, and it is more than the setting or surroundings. Participating in an interactive experience—and especially when it comes to experiences happening in public space—is also about how what you do is experienced by someone else, and of how you know that other people are seeing and experiencing that you are experiencing something.

When discussing the aesthetics of interaction, this aspect of perception as a performance and not just an individual experience is highly important for people’s relations to and perception of an interactive system. The user of *Bridge* is more than just a user, because using *Bridge* is a matter of being an operator, a performer and a spectator all at once: as a user walking on water, you are both operating an interactive system, performing for other people while operating, and, most importantly—because you are both operating and performing—you are also an implicit spectator of your own actions since your own actions will be the ones that other people are experiencing.

In this article, we will argue that what we observed when we went to experience *Bridge* happens in all meetings between users and interactive systems. We will demonstrate that the user continuously and simultaneously acts out three kinds of participant roles and that her awareness of all three roles shape her experience. This is what we saw when observing *Bridge* and in this article we will investigate the consequences in real-time co-located situations related to experience-oriented applications of IT. Simultaneous participant roles is a valid principle in a wide range of areas from which designers of interactive systems can learn: Many everyday experiences implicitly encompass different roles, just like many artworks—analog or digital—put this mechanism of multiple participant roles into play. These artworks intentionally integrate the simultaneous roles into the form and expression of the object and the participant’s perception process. Consequently, we will elucidate the subject by drawing upon examples



Fig. 1. Michael Cross' *Bridge* at the exhibition space Dilston Grove, Cafe Gallery Projects London, London, UK. Photo: Michael Cross.



Fig. 2. Spectators watching *Bridge* at Dilston Grove, London, UK, Oct 2006. Photo: Lone Koefoed Hansen.

from a range of areas not normally referred to within HCI and design literature simply because few successful attempts have been made to integrate the user's performance of her own perception into the system.

In the following, we will present the concept of the user performing her own perception by drawing upon work within the field of HCI on to system-user-spectator relations, performance theory, phenomenology, and sociology, coupled with analyses of different examples, ranging from everyday interactive products to art installations such as *Bridge*.

2. RELATED WORK IN HCI: RELATIONS BETWEEN USERS, SYSTEMS AND SPECTATORS

The increase in public and semi-public interactive systems of late has prompted a number of contributions to the HCI community with regards to the relations between systems, users, and spectators. With the particular theme of this article in mind, we will introduce and discuss contributions that highlight: (1) tensions between system and user (user \leftrightarrow system), (2) tensions between the system-user interaction and spectators thereof (spectator \leftrightarrow [user \leftrightarrow system]), and (3) tensions between user and spectators (user \leftrightarrow spectator).

An introductory note on terminology: We use the term "user" to denote a person interacting with a system. We use the term "system" to denote the artefacts with which the user interacts; this may be a discrete entity or a constellation of multiple artefacts. We use the term "spectators" to denote persons somehow observing the interaction between user and system; this observation may be co-present or it may be mediated in various forms. In particular, the use of the term "*user*" is contested ground. A main line of argument in this article is that the user takes on various roles throughout the interaction process. For this reason we initially refrain from using the term "performer" instead of "user," for this is just one of the roles played by the user.

2.1 User \leftrightarrow System Relations: Towards Embodiment and Contextual Interaction between User and System

Human-Computer Interaction has from the outset self-evidently been chiefly concerned with the user-system relationship. In the canonical, Grudin [1990] describes five historical foci of interface development. This development begins with interfaces at a hardware level and evolves through interfaces as programming tasks, terminal interaction, interaction dialogues and (anno 1990, when the paper is published) extends into the interface as the work setting, encompassing multiple end users interacting with systems in collaboration. Thus, contextual aspects surrounding the user-system interaction have gained increasing prominence in HCI.

More recently, Dourish [2001a, 2001b] discusses the concept of *embodiment* as a foundation for context-aware computing. Taking his departure in what can broadly be labeled tangible computing (e.g., Ishii and Ullmer [1997]) and social computing [e.g., Dourish and Button [1998]; and Suchman [1987]). Dourish [2001a] presents the argument that these two fields of inquiry share a common basis with respect to the importance they ascribe to the context in which

interaction takes place. As a foundation for understanding and exploring interaction in context, Dourish [2001a] posits the concept of embodiment. Embodiment stems from the philosophical position of phenomenology and implies not merely physical presence (although that certainly is a key aspect of embodiment), rather “embodiment denotes a participative status, the presence and occurrentness of a phenomenon in the world. So, physical objects are certainly embodied, but so are conversations and actions.” [Dourish 2001a, unpag.]. We perceive and act in a world laden with meaning, and meaning is constantly being enacted and renegotiated through our interactions with each other and the world.

In terms of the trichotomy of system-user-spectators, Dourish [2001a, 2001b] conceptualize the situation of interaction holistically, in that embodiment implies always already being in a reciprocal relationship with the context (encompassing both users, interactive systems, spectators, co-users, physical surroundings and the meanings ascribed to these entities) in which you interact. In that sense, embodied interaction deals not only with the system-user-spectator constellation, but also with the broader context within which it is situated.

Pertinent to the theme of this article, we can however deconstruct the systemic concept of embodiment to gain an understanding of some of the tensions between user and system. First and foremost, it is a relationship characterized by the user’s exploration of the meaning of the system. When social and tangible computing systems appear “natural” or “intuitive” to users, it is often because they offer users ways to “uncover, explore and develop the meaning of the use of the technology as it is incorporated into practice.” [Dourish 2001a, unpag.]. Second, meaning is not a constant, rather arises from the user’s interaction with the system. With regards to designing interactive installations and staging experiences such as *Bridge*, this implies that one cannot control what the system means to the user, only influence the construction of meaning: “What a user means by engaging in some action [...] may have little to do with what the designer imagined” [Dourish 2001a, unpag.].

The aforementioned extending foci of interface development described by Grudin [1990] has now, 17 years on, led to HCI becoming increasingly interested in not only how contextual aspects influence the user–system relationship, but also how the user–system relationship is perceived by spectators in the interaction context and, as we will elaborate on in this article, how this awareness of being in a user-system-spectator trichotomy affects the user.

2.2 Spectator <=> (User+System) Relations: On Designing Spectator Experiences

Reeves et al. [2005] addressed the issue: “How should a spectator experience a user’s interaction with a computer” [p. 748]. Borrowing on terms from performance theory, the paper denominates the user as performer and the interaction between performer and computer as performance. It is the spectators’ relation to and experience of the performance that is at the heart of the paper.

In their exploration of this relation, Reeves et al. [2005] made the distinction in performances between *manipulations*: what actions does the performer carry out to operate the computer, and *effects*: what are the observable results of these actions for the spectators. A central aspect of designing spectator experiences is the degree to which manipulations and effects are concealed or revealed, and Reeves et al. classify performances according to how both manipulations and effects may be hidden, partially hidden, transformed, revealed, or amplified. For example, the use of computers for composing emails most often entails hiding both effects and manipulations (which makes for a nonexisting spectator experience), watching a Powerpoint presentation relies on amplified effects and partially hidden manipulations, whereas much of the fun of observing someone playing a game of *Guitar Hero* or *Dance Dance Revolution* comes from the interplay between revealed manipulations and revealed effects in the player/performer's mastery of the game.

Reeves et al. [2005] leaned upon these distinctions in their discussion of possible strategies in designing spectator experiences which they denote secretive (hidden effects and manipulations), expressive (revealed or amplified effects and manipulations), magical (hidden manipulations and revealed or amplified effects), and suspenseful (hidden effects and revealed or amplified manipulations).

These strategies are presented as a framework for designers when considering spectator experiences, which in our system-user-spectator trichotomy can be described as the observation of the system-user interaction. It is worth noting that in Reeves et al.'s [2005] terminology, this interaction is denoted *performance*, and the engaged user is denoted *performer*. While we find Reeves et al. [2005] a highly interesting paper, the introduction of the spectator–performer terminology is too broad for many purposes as it includes all system-user interactions into the terminology that by inference allows for the term user to always be substitutable with performer. The terms *performer* and *performance* are fit for the purpose of Reeves et al. [2005] as they are broadly defined allowing for the arguments on spectators' engagement to come forward. But on a general level it is not satisfactory to use specific terms for a broad purpose as this leaves us with a crippled vocabulary; it is simply too reductive to use *performer* as a synonym for user and *performance* as a synonym for interaction as it makes us unable to distinguish between people who are interacting in solitude and people interacting with other people present. As we will address below, interacting with other people present makes a big impact on the interaction itself as one is actually performing *for* someone. A user's experience of being a performer in a designed environment for others to observe and the resulting change in the user's relationship to spectators, is only touched upon briefly in Reeves et al. [2005]. This is understandable in the light of the scope and focus of Reeves et al. [2005]; however, as we will argue in this article, the ways in which the user perceives and experiences the act of interacting with a system under the potential scrutiny of spectators greatly influences the interaction as a whole. We will argue that it is precisely this awareness of the (potentiality of a) spectator that transforms a user into a performer. For this reason, the spectator experience most certainly also has to do with the user's

experience. Reeves et al. [2005] mentions this relation in terms of performer *awareness*, a concept explored in a number of contributions to the fields of HCI and Computer-Supported Cooperative Work (CSCW).

2.3 User-Spectator Relations: Mutual Awareness in Interaction

The concept of awareness figures prominently in a number of HCI and CSCW studies, among these [Bellotti and Bly 1996; Bellotti and Dourish 1992; Orr 1990]. Awareness in these contributions is understood as a reciprocal, socio-functional relationship: “Awareness is an understanding of the activities of others, which provides a context for your own activity.” [Bellotti and Dourish 1992, p. 107]. Partaking in activities in social settings often, if not always, requires awareness. For example, in work settings, awareness helps you ascertain whether co-workers are available for discussions, what projects they are working on, what their mood is etc. These types of information are made available to us through so-called *awareness mechanisms*, which may be explicit (e.g., I make a note in a document that I am writing with a colleague that I have changed a paragraph) or implicit (e.g., my colleague assumes that since another paragraph has changed since she last saw it, I must have changed it even though I have not made a note of it). When we describe awareness as a mutual relationship, it is due to the fact that skilled participation in a social situation also implies that you yourself provide awareness clues to others. These may come about through conscious deliberation (e.g., I may pretend to be hard at work so I can avoid talking to obnoxious co-workers), although most clues are subconscious, or possibly somewhere in between the conscious and the subconscious.

However, most awareness studies, being rooted within the field of CSCW, focus mainly on the work-related aspects of the user-spectator relationship, for example, studies and design examples address issues such as how to set up automatic IT-supported awareness mechanisms for distributed work, how to make clear in which ways co-workers have modified documents, how to find out when it is possible and appropriate to contact co-workers on the phone or via instant messaging etc.

Although we address the dialectics of user-spectator relations, the argument presented in this paper extends the socio-functional, work-oriented aspects of awareness.

Benford et al. [2006] partly touch upon the user-spectator relationship. Extending the strategies for framing spectator experiences in Reeves et al. [2005], the authors examine strategies for blurring the frame of performance in a public interactive game/performance. Performance participants are divided into bystanders (unwitting spectators), audience (spectators participating actively) and performers (the designers and their helpers orchestrating the performance/game before and during the audience’s participation). The paper examines how strategies of blurring frames between bystanders and performers may be used in design of mobile experiences for the audience and it briefly examines the audience’s experience of these blurred boundaries.

Like Reeves et al. [2005], Benford et al. [2006] is an intriguing paper addressing important aspects of real-time co-located computer-mediated experiences.

But unlike Reeves et al. [2005], the user is not denoted *performer* even though the user is acting in public space: the user who was a *performer* in Reeves et al. [2005], is called *audience* in Benford et al. [2006] while *performer* is understood in a more classic sense as a person instructed in performing specific actions at specific times during a staged event—even though the particular performances discussed are open for changes according to the audiences' actions. The resemblance to role-playing games in which performers act according to specific rules and plots set up by game masters, is obvious. Still, urban games like the ones described in Benford et al. [2006] differ significantly from urban role-playing in that the former have a fixed timeframe and not least in that even though both audience and designers (performers) are participating in the same space and the same story, they are almost not part of the same game/performance as designer-performers have to make sure that audience-performers are behaving according to the story's timeline. Even though it may not appear so for the audience, they have very little freedom to make their own decisions as the performers are always ready to keep the audience on the right track according to the story.

In a computer-mediated urban performance, this framing is the main factor in establishing the performance, as put forward by Benford et al. [2006], in which case it is of course important to be aware of how to design the frame. Nevertheless, this frame adds aspects of being-a-performer-for-others and being-aware-that-one-is-being-a-performer-for-others to the audience's experience of the performance as the performance is also an experience of being a performer for both bystanders, performers and other audience members. In short, audience members are neither just experiencing or perceiving a story nor just performing a role—they are performing their perception of the setup, the story and the surroundings. We do not see this fully recognized in the framework offered in Benford et al. [2006].

Let us sum up our position and focus in relation to related work within HCI: The main part of HCI literature has evidently addressed the system-user relationship. Contextual perspectives that expand this focus have gained increasing prominence within the field, exemplified by Dourish [2001a], which provides a strong conceptual foundation for understanding the user's relation to systems. The emergence of public and semi-public interactive systems have further extended to studies of spectators' experience of system-user interactions, and in this line of work [Reeves et al. 2005] presents a focused discussion about spectators' experience of the user-system relation. However, these contributions touch only briefly upon the tension in the system-user-spectator trichotomy that has to do with how users experience their interaction with systems in the knowledge that they are potentially putting on a performance for spectators, and how that affects the whole situation of interaction.

The focus of this article in the light of related work is sketched in Figure 3.

3. PERFORMING BEING-A-USER—PERFORMING PERCEPTION

The relation between the system's user (as quite literally inscribed in the system's interactivity design) and the user's actual use of the system can be

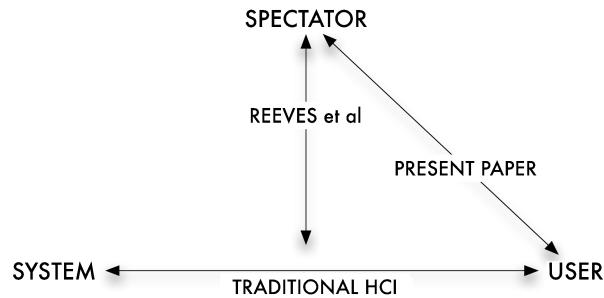


Fig. 3. User-system-spectator tensions and the focus of this article.

characterized as one of double play: the user knows that she is inscribed in the system and she uses this knowledge as a way to understand and play with the system; it resembles a simple cybernetic feedback loop as, for example, Aarseth [1997] has established as a distinctive feature of hypertext. The relation can be described as a correlation between the user's *act of perceiving* and *act of interacting*. As we will show below, the *act of performing* is, however, added when use becomes socially situated—when use becomes possible for others to observe. Among others, Bentley [1964] and Goffman [1959, 1966] have argued that there is always a performing aspect of people's actions even though the extent to which it is essential for an action varies with the setting and the person acting. Regardless, the act of performing is essential when someone is physically experiencing and/or operating a system in front of others and we analyze the use situation from a dramaturgical or performative perspective.

It will be our claim that the tension between the user operating on the system and the spectator watching this operation is imbued with the user's awareness of being in the center of the spectator's focus. She is not only (actively) perceiving the system's possibilities or the performance that takes place by help of the system but her operations and thus her perception is heavily influenced by her knowledge of that her perception of the system is a performance for others. This reciprocity is what we call *performing perception*.

In this context, we understand performance as a very physical thing; it is the actual actions taking place and not a dramaturgical or narrative term as for example, Laurel [1991] uses the term. As also Iacucci et al. [2005] points out, Laurel uses theatre metaphors and terms to understand how one can design a use experience such as the flow of an interface as if one were setting up a stage for the user to explore or perform in. Following, but slightly specifying how Reeves et al. [2005] use the term, we will use the term performance to denote a situation in which someone is actually performing actions in front of others—the *act of performing*. More specifically we will show below how the user's awareness of how her *act of perceiving* is an object for someone else to perceive affects her *act of interacting* to a degree that may even prevent her from interacting if the system does not acknowledge this interplay (Figure 4).

Performing perception thus describes how the user is simultaneously engaged in three actions: the act of interacting with the system, thus understanding

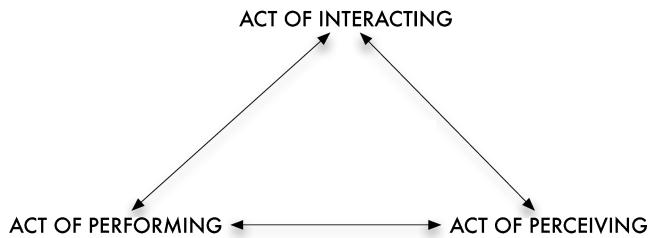


Fig. 4. Model of acts of performing, perceiving and interacting.

Fig. 5. Kaffee Matthews' *Sonic Bed* in use by Lone Koefoed Hansen at OK Center for Contemporary Art, Linz, Austria during Ars Electronica, Sept. 2006. Photo: Jacob Wamberg.

which possibilities she has and how she can operate the system; the act of perceiving the relation between her and the system and her and the surroundings; and finally the act of performing where she is a performer for others to observe.

The following example will demonstrate how the tension between the act of perceiving and the act of performing can be a vital part of the object's form and expression, and thus how it can be staged as a part of the use situation and the resulting interaction potentiality of an object. Afterwards, we will move on to establishing an understanding of why this is the case.

3.1 Sonic Bed

In *Sonic Bed* [Matthews 2006] (Figure 5), a 12-channel speaker system enables you to listen to music compositions with your entire body while being in a custom-made bed in which the speakers are embedded. *Sonic Bed* is a

artwork and a display for artworks at the same time—or a music instrument as the artist Kaffe Matthews prefers to call it—to which musicians can compose music. Based on the fact that sound appears because sound waves literally move air, the bed presents the user with embodied music if she climbs the bed and normal music if she chooses to not climb the bed. In order to listen to the music with your body, you climb the bed, lie down and find yourself in a perfect listening position where soon various parts of your body will begin to shake and shiver due to the air pressure generated by the speakers underneath the mattress.

Experiencing *Sonic Bed* is curious; lying in a bed is normally an intimate experience, but here other people are free to enter. Listening to music is not normally an intimate experience (it may, however, be private if only you yourself are able to listen), but in this case, music has an intimate effect since your whole physical body is shaking—sometimes a foot, sometimes a shoulder and sometimes the pelvis or a buttock. In *Sonic Bed*, the user is on display, both due to the fact that the combination of user and bed is the only visuals present and due to the bed frame's literal framing of her—as if the user is a sculpture in a display case or a picture in a frame. The alluring aspect of *Sonic Bed* is that it contains these oppositions; it is neither a fully immersive or contemplative experience since there is always an awareness that you yourself are on display, nor is it a fully public experience since the music you experience is unique to you and your body's position on the mattress.

Sonic Bed is not an interactive piece—the music does not change according to how people position themselves in the bed—but it is a piece where position and movement between positions means everything. The artist created the bed in an explicitly ambiguous idiom but she is still puzzled that people tend to not move at all; that they hesitate to explore the music with all of their body. They get into the bed, position themselves, and the next time they move is when they exit the bed. Alternatively, they could have entered the bed, lied down and then moved around—lying in a diagonal, lying on their back, on their front, elevating parts of their body etc. It appears that not wanting to draw attention to oneself and not wanting to be in the focus of other listeners is a force hard to snap out of, even though this ambiguity of being immersed and being on display is a big part of the experience of the work and even though it is a considerably more intriguing experience when you explore the sound waves with your body.

3.2 Social Behavior

One way of casting light on the always already installed interplay between the user's actions, the situation she is in, and her relations to other people present, is to turn towards the seminal observations and interpretations of the sociologist Erving Goffman. Goffman's research was devoted to observing and analyzing how western people behave in social situations. Goffman applied dramaturgical terms and principles to sociological observations, and viewed the presentation of the self as a dramatic effect applied in a specific time, at a specific place and for a specific audience. As Brissett and Edgley [2006, p. 78] points out, dramaturgical sociology does not study what people feel, but how they behave

when they believe to be “on”, thus “reading” cultural conventions from people’s actions in specific situations.

Goffman [1959] is mostly known for his accounts of front stage and back stage behavior—of how people try to present themselves while in public space. In this case, however, Goffman’s notion of focused and unfocused interaction is much more relevant as it focuses on the implicit negotiations taking place when two people are in the same situation and on how people’s actions are primarily based on how they believe their actions would fit into the situation instead of being primarily based on their own idiosyncratic preferences. Situatedness is not a new concept in HCI, but Goffman’s definition will, however, shortly prove to be very useful so we will quote it here:

The term *situated* may be used to refer to any event occurring within the physical boundaries of a situation. Accordingly, the second person upon a scene transforms everything done by himself and by the one already there into situated activity, even though there may be no apparent change in the way the person already present continues with what he had been doing. The newcomer, in effect, transforms a solitary individual and himself into a gathering [Goffman 1966, p. 21]

Goffman’s point is that in any given situation, every western individual will be relating to the other people present—also when this awareness of other people is not directly visible. Being situated means being aware of your surroundings to a degree where all actions in the situation are coupled with the awareness of the situation. Goffman’s use of the word “gathering” draws attention towards the frame or the stage created and sustained by social relations.

More importantly, Goffman classifies relations in a situation as either focused or unfocused. Focused interaction is “the kind of interaction that occurs when persons gather close together and openly cooperate to sustain a single focus of attention, typically by taking turns at talking” [Goffman 1966, p. 24], and unfocused interaction is when people are in the same situation but without interacting even though they still manage to be somewhat aware of each other’s presence: “In this realm of unfocused interaction, no one participant can be officially “given the floor”; there is no official center of attention.” [Goffman 1966, p. 34]. Thus, unfocused interaction is all about “fitting in,” and it is what most of us spend most of our time doing. When in the bus, when at a talk, when at the gallery or when in public space in general. One of the reasons why people prefer maintaining unfocused interaction in public space is, according to Goffman, that this is a way of maintaining some sort of privacy—some sort of private space. In other words, we get to be ourselves even though that self is always a front stage self when we are in public. In unfocused interaction, people can attend to their own business without having to take other people too much into consideration as it is understood that the situation is neither one of direct interaction nor one where other people will be interested in your actions unless you act in a way that transforms unfocused to focused interaction. Thus, both focused and unfocused interaction is based on a contract; in focused interaction we agree that we are each other’s primary contact, in unfocused interaction we implicitly agree on recognizing each other’s existence in a common space while not initiating (or wanting to initiate) focused contact.

3.2.1 Focused or Unfocused Interaction. Goffman's observations partly explain why we find it necessary to develop further on the notion of the spectator experience presented in Reeves et al. [2005]. Most interactive systems are designed with the specific user in mind—as a result of the desired relation between the system and the one(s) using it. Much recent HCI research is about making a system that works on the user's terms. The system and the use of the system is supposed to (and is considered appropriate and well made if it) "folds around" the user, thus making the user the center of the system. Use of the system is most often supposed to be what [Forlizzi and Battarbee 2004] refer to as "an experience"—something that "has a beginning and an end, and often inspires emotional and behavioral changes in the experiencer" [Forlizzi and Battarbee 2004, p. 263]. If relations to other people are considered, it is always in relation to the use of the system—does it work under specific work conditions, does it facilitate interaction with multiple users, or does it work as the desired social tool.

Essentially, we believe that Goffman's notions of focused and unfocused interaction contribute to an understanding of interactive systems as something that is always about focused interaction even if focus is peripheral as in slow technology [Hallnäs and Redström 2001]. You are never supposed to *not* care and the system will always be the "official center of attention" (cf. Goffman [1966]) or at least designed so it can easily become the center should it be necessary (cf. Hallnäs and Redström [2001]). Contrarily, the user's relations to everything unrelated to the use itself is supposed to be unfocused or maybe even nonfocused as she is not expected to reflect on events that are unrelated to her use. Nonfocused is not a Goffman term because according to him, a situation can only consist of focused or unfocused interactions as people will always be aware of other people's presence and they will always act according to how they perceive themselves in the eyes of others. However, when analyzing existing interactive systems and papers describing them, the notion of peripheral spectators is rarely touched upon and if it is, it is considered of minor importance. Benford et al. [2006] and Reeves et al. [2005] are two examples which both touch upon the issue of spectatorship in interactions with public installations, but which do not attribute any significant importance to the spectators' effect on users' interaction with systems. This lack of recognition points toward a premise of nonfocused interactions: Systems and, by inference, system designers are almost never expecting people to experience focused or unfocused interaction towards surroundings that are not part of the interaction or the interaction goal.

However, works or systems like *Bridge* is pointing out how it may be true that you are in a focused relation to the system, but this focused interaction is in itself part of a focused interaction with the surroundings—in this case the prospective users waiting on the deck. Our point being that the user (and in part also the system itself) expects to be in an unfocused (or maybe even nonfocused) relation to the surroundings, but in focused interaction with the system. As a user, you want to interact with the system on your own terms and you expect to be in the system's center of attention and most importantly, you expect to be able to have the experience of the system at the center of your

attention. Typically, systems even set the stage for this interaction individuality as it is typically assumed that interaction with the system is based on focused interaction while other things move to the background. This is also the case with experience oriented systems where the system is made for—and the user is interacting in order to get—experiences.

Unlike artworks like *Sonic Bed* where the juxtaposition of being a performer while also being a spectator purposely contributes to the experience, focused interaction towards the surroundings is rarely built into the interactive system itself and rarely does it become a planned part of the experience. It would appear that many interaction designers implicitly believe that they are creating non-focused or maybe unfocused interaction towards the surroundings if they are not specifically creating a spectacle meant to be a center of attention. However, if we take Goffman's observations and analyses into consideration there is never such a thing as completely unfocused interaction between either of the entities system, user and spectator (cf. Figure 3). Interaction between either of the three will never be nonfocused, it will maybe be unfocused for a while but it will always be focused at some point, and it will always be on the verge of becoming focused again when it is unfocused.

Our point is that unfocused interaction is implausible when it comes to being watched while being a user in experience design systems as the user is precisely "the center of attention" (cf. Goffman [1966]) from the spectators' point of view and the user is very well aware of this. Accordingly, the user experiences a double focused interaction—she is focused on both the system use and her relation to other people present; and in this sense interacting with a system is no different than interacting in other cultural settings.

3.3 Performing a Role

It follows from the above mentioned double focused interaction where the user is performing her own perception of the system, that she has to simultaneously adapt to different roles when interacting with a system. The performing of her perception contributes to the aesthetics of interaction as the user's role play is a result of the system's or object's form, expression and interaction design just like a performance in a theatre play is a result of aspects like script and staging.

BodyBug [Moen 2005] (Figure 6) is an example of an object accomplishing this. *BodyBug* is a prototype aiming at creating a kinaesthetic experience. A small box containing mechanics and electronics runs on a wire attached with velcro to two points on the user's body. Moving her body, the user also moves the wire which triggers the case to respond by moving up or down the wire. According to user studies, *BodyBug* provided users with "an experience of being able to feel beauty in their movement, that is, an aesthetic experience; sensing their bodies, and they had found new ways of moving and make use of their bodies" [Moen 2005, p. 123]. Simultaneously, the user's movements with *BodyBug* was a spectator oriented performance: "The interaction *BodyBug* creates engages not only the mover but also the audience as they often make comments on the movements and the interaction created by the user" [Moen



Fig. 6. *BodyBug* in use by Jin Moen, the inventor. Photo: Peter Knutson.

2005, p. 123]. Interestingly, *BodyBug* integrated these two aspects in a way where users quickly accepted and played with the knowledge of perceiving and performing at the same time, as users “also expressed the insight of people having very individual movement patterns and qualities of motion, as well as an increased consciousness of their own movement pattern” [Moen 2005, p. 123]. In this case, the form, expression, and interaction design deliberately set the stage for the user’s acceptance of performing her perception as part of the experience. Here, it could be due to the fact that she had the possibility of interacting in several ways; from extreme movements in space to hardly perceivable movements with the parts of her body that *BodyBug* was attached to. She was, in other words, able to partly control how she came out as a performer.

In accordance with Reeves et al. [2005] and Benford et al. [2006], we believe that the realm of performance studies and theory can be helpful when understanding user interactivity. Also Hare and Blumberg [1988] states: “we assume that there is a continuum ranging from everyday activities that do not have a dramatic quality, through social events that are consciously staged, to theater productions” [p. 14]. Building upon the considerations in Reeves et al. [2005], we will, however, in continuation of our application of Goffman, claim that *it is as important to design for the user’s role as a performer as it is to design the user-system interaction and to design for spectators*. This is because spectators are watching a user who is very conscious of her role as performer. It thus follows that it is impossible to design for spectator experiences without also seriously considering how to design for users to be performers while simultaneously being operators of a system and spectators of their own performance.

3.3.1 Playing your Part. Goffman’s observations on focused and unfocused interaction highlight the fact that we are always aware of our immediate surroundings, regardless of whether we are in direct interaction with people around us or not. Goffman’s base for analyzing social situations is the dramaturgical realm whose terminology is also important when moving from observing the socialized everyday lived life to designing systems for experiences that are always socially situated when they happen in public space—or in a gathering, to use Goffman’s terms. Creating spectacles and hence spaces for gatherings is an important part of most experience design and consequently, we need to look more closely into the dynamics of gatherings; of how we can further understand the dynamics of the different roles played by the user while she participates in an interactive gathering or experience.

SKIN Probes are prototypes by Philips design. Two dresses reflect the wearer’s mood and body state. *Bubelle* (Figure 7) comprises two layers of garment, the inner one measures emotions (skin signals interpreted as emotions) and projects light onto the outer layer, thus responding visually to the wearer’s emotions.

Frisson (Figure 8) is a body suit that responds with lighting up LEDs when the suit is blown on. Both prototypes are thus fairly direct visualizations of what is normally a private, intimate and bodily experience: blushing and shivering (or the reddening and goose pimpling of skin, respectively), and both prototypes



Fig. 7. The Philips Skin Probe *Bubelle*, promotional photo.



Fig. 8. The Philips Skin Probe *Frisson*, promotional photo.

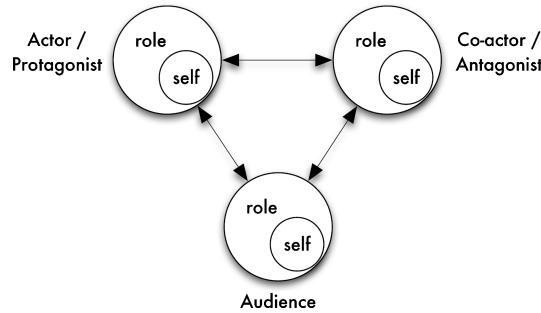


Fig. 9. Hare & Blumberg's model of the performance situation.

transform the wearer from being a person wearing clothes to being a performer literally carrying her “inner self” on her dress.

There are many ways in which this project can be questioned; does it make sense to talk about an inner self, is it actually the wearer’s emotions that are being exhibited, or is it a constellation of stimuli or response which do not necessarily cohere. Both dresses are, however, unquestionably examples of highly performative clothing, no matter what is actually being performed.

We can further our understanding of the implicit dynamics in an interactive object like *SKIN Probes* by recalling what theatre critic Eric Bentley writes on the theatrical situation:

The theatrical situation, reduced to a minimum, is that A impersonates B while C looks on. [...] Impersonation is just half of the little scheme. The other half is watching—or, from the viewpoint of A, being watched. Even when there is actually no spectator, an impersonator imagines that there is, often by dividing himself in two, the actor and his audience. The very histrionic object, the mirror, enables any actor to watch himself and thereby to become C, the audience. And the mirror on the wall is only one: the mirrors in the mind are many. [Bentley 1964, p. 150]

Following Bentley, *SKIN Probe* acts as a stage where A (the wearer or user) displays or performs B (her body and her immediate feelings as seen through *SKIN Probe*’s rendering) to C (the people in her surroundings). As Bentley notes, C is a conceptual rather than an actual entity; A, the performer, is fully capable of impersonating even though there is no audience. In other words, Bentley highlights that the essential part of a performance is not that someone is actually being looked at, but that someone is impersonating or performing someone or something before a potential audience.

Bentley’s writings have been picked up by dramaturgical sociologists like Hare and Blumberg [1988] who, following both Bentley and Goffman, have applied performance theory to social situations. Hare and Blumberg [1988, p. 8] expands Bentley’s model to also incorporate a co-actor or antagonist and several reference groups (an audience that may only be present in the mind of the actor), thus diagrammatically depicting the performance situation and consequently the basic tensions of social interaction as also Goffman observed (see Figure 9).

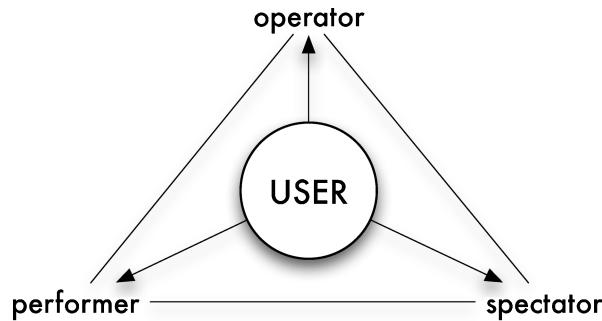


Fig. 10. User roles.

Again, the fundamental part of a performance—someone performing something in front of a (potential or imagined) audience—is the interconnections between the actor/protagonist, the co-actor/antagonist and the audience. All come to life because of the connections to the other entities. Goffman applies these fundamental principles to social interactions, but also reminds us that even normal nonstaged everyday settings are under the influence of social norms and interpersonal interaction paradigms.

It is unlikely that a user interacting with a designed and staged system with the aim of providing some sort of interactive experience will not also be under the influence of these social paradigms—even if the user chooses to disregard them. Thus, understanding the aesthetics of interaction will amongst other things be a matter of finding a way to design for the user to be able to dynamically alternate between different roles.

Combining Bentley's thoughts on how the performer, A, relates to the audience, C, with Goffman's thoughts on focused interaction and Hare and Blumberg's formal application of theatre theory on everyday life, we are given a framework for understanding and ultimately designing for the user's different roles.

In Figure 4, we depicted the relations between three different user actions (the acts of performing, perceiving and interacting, respectively). Relating the statement to the findings of Bentley and Hare and Blumberg, we can now transform the model of actions to a similar model of user roles (Figure 10).

In Hare and Blumberg's model, the dramaturgical situation of a play was analyzed in order to project it onto real-life situations in the spirit of Goffman. The point of both Hare and Blumberg and Goffman is that this is everyday life; we are talking about ordinary people acting in accordance with cultural conventions. The conventions serve a function very much like the conventions of the theatre situation. There's a stage (the situation), a performer (the person) and an audience (the people sharing a situation with the person). Also Lahr and Price [1973] states: “the life performer [...] is continually being placed in cultural scenes in which special performances are demanded” [p. 6].

Consequently, when Reeves et al. [2005] states that it is important to design for the spectator experience, we agree; as soon as interaction with the system takes place in public there will be people looking and sometimes those

people are supposed to be the next users. However, when looking at the dynamics between the performer and the spectator, it becomes clear that designers cannot address the one relation or role without addressing the other. If there is an actual spectator, the user is highly likely to not only be engaged in a focused interaction with the system but also with the spectator. And if there is no actual spectator but only a potentiality for an actual spectator, there will still be some sort of focused interaction towards an imagined spectator (cf. Bentley's "the mirrors of the mind are many" [Bentley 1964, p. 150]). Both kinds of spectators—imagined or actual—have great influence on the other roles the user is playing and hence on her use and experience of the system. The user is consciously or subconsciously always performing in front of imagined or real others when she interacts with the system in public space. She puts herself on the line and becomes a performer of her own perception. Implicitly, an interactive system becomes the stage for not only the user's perception of the system but for her perception of her own act of performing in and with the system.

4. CASE ANALYSES AND DISCUSSIONS

Throughout this article, we have addressed several of the aspects of the user's performing of her perception by partly presenting theoretical foundations and partly pointing to issues raised as we have encountered various experiences within the last couple of years. The cases presented have so far been pointed at raising or illustrating a specific issue and not all of the examples have been making use of interactive technology. In the following, we will bring together all of the considerations on what it means to the user that she is simultaneously an operator, a performer, and a spectator and more importantly, what it means to the use situation, that the user is bound to perform her perception. We will bring the considerations into play by analyzing three different examples of how people use an interactive system in public or how they publicly use technology, thus demonstrating how the 3-in-1 of user roles and particularly how the performing perception shapes the user's experience.

They hint at how conventions may change (on the one hand) or how designers may successfully incorporate the aspects into the design (on the other hand).

4.1 Case 1: Physical Computer Games

A vignette from a video games arcade in Trocadero, London (Figure 11):

In the cacophony of rows upon rows of video games, a group of friends take turns playing a game of *Dance Dance Revolution*. Highly choreographed, the player presently playing interacts by moving his feet in well-timed response to the sounds and imagery of the game. He easily navigates the early stages of the game, the tension rising, the beat accelerating, and the applause of his friends escalating. In the latter stages of the game, his mastery begins to falter and after a number of missteps, his game is eventually over. His friends cheer him up, pat him on the back, and a new player steps up, eager to play and impress.

The interaction is clearly focused for the group of friends taking turns playing *Dance Dance Revolution*. The player's attention is directed towards the sounds and visuals of the game, although he is also obviously aware of the bystanders



Fig. 11. Dancing in a video games arcade.

friends, their behaviour, and their impression of his playing. The bystanding friends are attentive towards the player in interaction with the game, and also towards each others' expressions and behavior. This assembly of game, player, and immediate spectators can be said to exist as one situation of interaction, circumscribed by another one, namely that of spectators in the games arcade observing the friends playing. To spectators outside of the group of friends, the group of people taking turns playing make up a performative spectacle in its own right. The attention of the player and the bystanding friends are somewhat

more unfocussed when it comes to this second layer of performance. However, the group of alternating players are in no way oblivious to the fact that they may be the center of attention for passers-by. The fact that they are more focused on the immediate game situation does thus not imply that they do not act as if they are in a public place in which certain behavioral norms are in place.

If we regard the roles that the immediate player of the game takes on, he is clearly the operator of the game as he responds to the auditive and visual cues by stepping on the input tiles. He is also simultaneously a performer in front of his friends in several ways. First, his immediate interaction with the game is a spectacle in its own right. Second, he is performing his skills and increasing proficiency at the game, all the while putting himself at risk since he knows that he will eventually reach a stage of the game at which he will be unable to keep up. This risk of putting oneself at stake is one obvious attraction of playing this type of game in public. Third, he also performs certain moves that are not explicitly necessary for interacting with the game, for example, he hums or sings in time with the music, he jiggles his hips, he lifts his arms in celebration when a stage is completed. This points to the third role that he is invariably played out at the same time as the two others, namely that of spectator. He is implicitly aware of his status as the centre of attention for his friends, and potentially for other visitors at the games arcade. This influences his observable behavior, but even more so it affects his whole experience of the interaction situation. In a fairly visceral game such as *Dance Dance Revolution*, we may denote the proficient player's experience as one of immersion, but it is not an immersion solely in the game-player interaction, it is an immersion in the whole situation of interaction: well-timed responses to the game, socio-culturally recognizable gestures and utterances such as raising ones arms in celebration, nods and comments to friends, pleasure in displaying expertise in front of strangers in a public place, adrenaline rushing in the knowledge of the imminent risk of failing.

Revisiting Reeves et al. [2005], the situation can be said to be based on an expressive strategy in which the manipulations and effects of player interaction are revealed and possibly amplified for the spectators. This is certainly one aspect of what makes *Dance Dance Revolution* a successful arcade game. It is however by no means the only one. We argue that the way in which the game and the staging of it engages the user by addressing the trichotomy of user roles—operator of the game, performer in public, spectator to one's own performance in relation to how the friends were or will be doing—is equally important, if not more so, in understanding why and how the game succeeds. The design of the spectator experience is necessarily a question of not just how spectators perceive the performance, but also of how users simultaneously perform their own perception and perceive their own performance (in relation to the other performances). In this case, the user is both a performative spectator and a spectating performer while he interacts with *Dance Dance Revolution*.

Dance Dance Revolution is just one of a steadily rising number of interactive games that rely heavily on designers' understanding and playing into the tensions of the user-spectator relationship. Even many years ago, arcade games and pin ball machines were to be found in eg. burger bars and even though

the place was supposed to be for shorter visits only, many customers hung out for hours watching each other play on the machines. More recent examples include *Singstar*, in which the performance aspect is even more prominent as players take turns singing pop songs, and many of the games produced for the Nintendo Wii console. Arguably, the Wii, despite its inferior hardware performance compared to rivalling consoles Xbox 360 and Playstation 3, has proved a hit because the Wii console and games developers have extended their view of console gaming as solely a question of user-system interaction and taken into account the performative aspects of gaming.

4.2 Case 2: Mobile Space

A vignette from Rome Fiumicino airport: An Italian man carries on a number of conversations on his mobile phone in the departures hall. All the while speaking, he keeps his voice down and maintains a certain distance to other travellers. He holds his phone to his left ear, keeping it there with his right hand index finger; this causes his right hand to cup his mouth and further muffle the sound of his voice plus it prevents other people from lip reading. While speaking he engages in eye contact with other people in an almost aggressive manner; he holds your gaze until you look away, but his eyes are not inviting you to engage in interaction with him. In this manner, he maintains a bubble of privacy, all the while being markedly aware of spectators who notice his distinct (and stylish Italian) way of conversing.

It is clear from the gestures and body language from the Italian man that he is looking for a way to not be audibly present in the public sphere while he is interacting with his mobile phone. He is simultaneously present in two domains at the same time as he is both in the domain of the conversation and in the domain of the airport. In terms of focused and unfocused conversation, he is engaged in a focused interaction via the phone. It may be mediated via the phone, but it is still a classical focused interaction in Goffman's terms. As Murtagh [2001, p. 85] points out, most people engaging in phone conversations go out of their way to not engage in focused interaction with people in their physical surroundings by that is, making an effort to not look into anyone's eyes while speaking. The Italian man, however, engages in a peculiar focused but still unfocused interaction with his immediate surroundings. He does look at you, but in a way that make you keep a distance by looking away. He forces onlookers into an unfocused interaction by being focused.

In terms of the roles of operator, spectator, and performer, this Italian man perfectly demonstrates how a person interacting with a device is focused on a lot more than the interaction itself—how a user is always simultaneously an aspect of all three roles. Also, he is the perfect example of how spectators are influenced by the way the user performs his perception of the situation he is in. The Italian man is never only one of the roles, he is always all of them: Clearly, he is *operator* of his mobile phone as he is engaged in a conversation mediated by the phone. Also, he is evidently a *performer* of his interaction and his desired privacy through his gestures and his way of engaging in eye contact. Finally, he is a *spectator*: he is watching other people's interactions towards him, and



Fig. 12. Joe Malia's *Private Public*. Photo: Joe Malia.

he is very much aware of how both he himself and his interaction comes out to other people thus shaping his performance from his observations and actions which in return shape the way other people or spectators relate to him.

Where Reeves et al. [2005] positions use of mobile phones in the secretive domain (partly hidden manipulations and hidden effects), this classification does not suffice in this situation and maybe be it never does. This particular situation is neither explained nor understood by only considering the operation of the device. The actual operating of the device is secretive (spectators are unable to see which buttons are being pushed and unable to see the display). Also, the effects are hidden if we define the effects as what happens on the other end of the device, that is what happens as a consequence of the interactions with the device. However, there is no doubt that the Italian man is having a phone conversation and as a whole the situation is very expressive or suspenseful. If we only take his button pushing into account, the manipulations are hidden, but interaction with a mobile phone is also audible and gestural and in this particular case the audible interaction remains hidden whereas the gestural aspects are highly amplified. So if we take the Italian man's situated actions into account, his interaction style is suspenseful at the least and sometimes even expressive, as the effects of his gestural performance are also revealed: as spectators, we effectively look away and are forced into not even try to engage in focused interaction with him.

Italian men are not the only ones with an eye on the performativity of mobile phones. Also *Private Public* [Malia 2006] (Figure 12) emphasizes “the privacy we sacrifice when using mobile technological devices in public spaces.” *Private Public* is a tube shaped scarf knitted in the round and it doubles as a hat. When

wearing the scarf as a hat, the user's face is hidden from the surroundings while the user herself is able to see through the end of the tube and onto the screen of the device she has fastened to the tube.

Private Public is a portable secretive space that doubles as an expressive interaction. It is an analog and physical manifestation of the same principles as the Italian man was demonstrating, and both are examples of the performativity of interactions and of how Reeves et al. [2005] is right when demonstrating that interactions with technology are also spectator prone. However, artworks like *Private Public*—and the other artworks in this article—highlight how we tend to forget that our interactions with technology are always present for other people to observe and how these observations are always (at least implicitly) shaping our interactions. Even if we have forgotten that the use of mobile phones in public space strangely mixes the private and the public space, we immediately know what *Private Public* call attention to when we see it in use. By making use of the portable space for secretive interaction, the user is in effect amplifying all of her actions. Spectators are not able to see what she is actually doing to which type of device; they only know that something is going on. This sounds like a secretive and almost nonperformative action. However, she will stand out in the crowd and thus be transformed from being able to stay in unfocused interaction to being the center of focused interaction even though her head is hidden. The very act of making the interactions secretive—the very performance of the secretive—instantly negates the secretive and makes it an expressive interaction tied closely to the act of *performing that you are perceiving* something. Thus, the form and expression of *Private Public* is always already embodying the three different user roles just like the Italian man performs them. As an object, *Private Public* manifests how the user is never able to be only operator, spectator, or performer of an interaction but is always all three at once. *Private Public* calls attention to the fact that interacting with technology in public space with other people (potentially) present is always also about when you show what to whom—about how you perform your experience or perform your perception of the interaction.

4.3 Case 3: Gumlink and the Gum Facade

A vignette from the world's largest sweets trade convention, die Internationale Süßwarenmesse (ISM) in Cologne, Germany: An interactive installation on the side of a stand displays a 3D space in which animated pieces of gum drop from the sky onto floating orbs before piling up on the ground (Figure 13). Business people, most of them wearing suits, pass by the stand, looking at the stand and the installation. A few of them notice faces appearing on the orbs—some are surprised to discover that the faces are in fact their own, and that the orbs follow them as they pass by, pushing aside the falling gum. Flustered, some of them quicken their pace, some of them smile at each other, some of them turn their gaze elsewhere.

At ISM, hundreds of manufacturers and re-sellers of sweets display their products and services to tens of thousands of professional visitors. One of the authors, working in a project at the Centre for Advanced Visualization and



Fig. 13. The Gum Facade at ISM 2006. Photo: Peter Dalsgaard.

Interaction (CAVI), has collaborated with Gumlink, one of the manufacturers present at ISM, to design interactive installations attracting attention and displaying information at the convention. Gumlink is a large, international chewing gum research and manufacturing company. One of the resulting installations of the collaboration between Gumlink and CAVI is the *Gum Facade*, which was put into use at ISM 2006.

Gum Facade was found along one of the exterior walls of the Gumlink stand. Camera tracking combined with face identifying software tracked people approaching or walking past the stand resulting in a live representation of the faces of passers-by on a large display on the wall. The faces were represented in the shape of orbs existing in a 3D space showered by small gum tablets. By moving in front of the display, users controlled their orb's interaction with tablets and potentially also other face-orbs. The intention was to get passers-by to stop in front of the stand and move around in order to control the orb in the 3D space and possibly play out mock games with other simultaneous users. Thus, the purpose was to create attention and attract visitors who might otherwise not notice the stand. However, during the convention *Gum Facade* turned out to not have the desired effect. Although most visitors seemed to notice the installation, very few of them paused by it in order to explore the potentials of interaction.

The use context for the installations, the sweets convention, is characterized as being bustling but simultaneously serious and restrained: A large number of visitors are present, however they are all there for business purposes (the convention is professional and not open to consumers), and as such observe

certain formal behaviors, both relating to dress-codes and behavior, that is, they wear suits, keep a professional distance, etc. The users and the use context, coupled with the Gumlink company values, thus put certain constraints on the type of installations that would fit into the domain.

The intended use of *Gum Facade* was a focused interaction in which the visitor would playfully interact with the virtual 3D gum universe. Following Goffman, the visitors were, however, constantly aware of the fact that if they were to interact with the facade, they would be under the scrutiny of their peers. While acceptable or preferable in some settings and situations (such as the aforementioned video games arcade), this was clearly not so in the case of the ISM convention. This setting in a sense already imposed a certain role upon the visitors, one of being serious businesspeople. In this role, a visitor carries out a certain formal performance, and this performance was at odds with the one proposed by *Gum Facade*.

In the role of the visitor-as-businessperson, the visitor is in a well-accustomed situation in which he has a high degree of control over how to appear in the gaze of others by extension of being aware of how to appear in the mirrors of the mind, in the words of Bentley [1964, p. 150]. The role of visitor-as-gum-facade-performer, on the other hand, is one that implies a high degree of risk of being thrust out of the visitor-as-businessperson role. The installation is explorative, in that it requires users to engage in order to make sense of the interaction, and it is furthermore, in the terminology of Reeves et al. [2005], an expressive one, in that it makes visible and enhances the manipulations of the user in front of spectators. Even though the installation did in fact not overly expose the users or caricature them in any way, visitors evidently shied away from it since they could not anticipate if and how they would be able to control how they would come out as performers in front of their peers.

In the design of *Gum Facade*, we made a number of assumptions about the user-system tension and the spectator experience that were seemingly sound. As for the user-system interaction, a fairly complex technical solution was created in order to recognize visitors' faces and display the live video feed of present user faces real-time on the 3D orbs. This allowed for a user to recognize that he was the one in control of the orbs. Based on the designers' previous experiences of users' preference for self-recognition in playful installations, it was intended to further engage the users in their interaction with the facade. As for the spectator experience, the expressive strategy made sense in that it was the expressed purpose of the installation to attract the attention of visitors passing by the Gumlink stand and draw them in.

In terms of the business visitor performing his perception, it is however evident that these strategies are not the ones best suited for the interaction situation. In this setting, it is untenable to position users in a situation that changes the mode of interaction from unfocused to focused, possibly against the will and intention of users. The intended spectator experience is undermined by the fact that the user is very much aware of how his acceptance of the intended *Gum Facade* performance will alter the way in which he appears in front of his peers. Put simply, a lot of effort went into designing interesting user-system relations and spectator experiences, whereas the design considerations



Fig. 14. *TouchMeDare*, promotional photo.

of the user's understanding of the performer-operator-spectator trichotomy was lacking.

As an explanation of the failure of the *Gum Facade*, the imposition of focused interaction in a setting with strict codes for unfocused interaction may seem somewhat banal and common-sensical. In continuation, one may fault the designers for the oversight of these seemingly obvious interaction dynamics. Whereas we concede the ostensible straightforwardness of this line of argument, we have two major incentives for examining it: One, the qualms of engaging in interaction with a public interactive system expand beyond settings with apparent formal codes such as a sales convention. These dynamics are at play in most, if not all, public settings; for example, van Boerdonk et al. [2007] who designed *TouchMeDare* (Figure 14)—a playful, collaborative musical device—reported similar problems of user hesitance and exposure, even when the installation was set up at a music festival brimming with party-going youths. Two, the very straightforwardness of the argument is all the more reason that considerations regarding performing perception should be an integral part of designing public and semi-public interactive systems.

Having analyzed the design shortcomings of the *Gum Facade*, the pertinent question is now which potential solutions the concept of performing perception offer. We shall examine this by suggesting strategies for rethinking the design approach to the situation rather than by presenting concrete design proposals for the situation, for the latter necessarily implies circumventing the contingencies of a re-design process.

Analyzing the lack of success of the installation by way of the user-system-spectator trichotomy put forth in this article, there is an unresolved conflict between the aspects of (1) the user-system tension (in which design decisions

were made in order to make it obvious for a user that he could in fact interact with the system in a playful manner), (2) the spectator experience (in which design decisions were made in order to catch the attention of the ISM visitors), and (3) the user performing his perception (in which he is implicitly aware that by interacting with the installation he will be putting himself at risk of appearing unprofessional and perhaps even ridiculous in the eyes of potential business partners who are all eager to keep up their professional self-presentation).

Addressing one of these aspects will necessarily affect the two other aspects for as we have argued, they are always already reciprocally intertwined in public or observable interaction situations. Since we propose that the user's perception of the interaction situation is of the essence, a starting point for redesign is to reconsider how we may create an interaction situation in which the user is not thrust out of the already established role of businessperson in the ISM setting. Since the aspects are reciprocal, this starting point is primarily analytical in nature, since the design process is necessarily one of alternations between the whole and the part, between the singular aspect and its relation to the over-all interaction situation.

One strategy for preserving the appearance of the user could be to employ one or more mechanisms of anonymization within the existing installation setup. For example, the link between the user interacting with the gum facade and the imagery on the facade could be made more opaque; the user's face could be removed from the spheres in the 3D space, or it could be manipulated to hinder recognition; the movements of the user could be delayed or otherwise modified, etc. Another strategy could be to change the interaction style to more closely resemble something within the domain of professional business users, or at least something more well known within the professional convention domain. The existing interaction style of the installation relies on movement tracking and resembles the style of a Nintendo Wii or a similar games console—a far cry from connoting serious business. If one were to re-design the installation's interaction style, more traditional methods of mouse-input or a touch screen could prove to be more suitable. Visitors would only be "forced" to employ only their hands and arms, making them less available as targets for other people's judgments. This would, however, also have removed the more experimental and spectacular part of the application which was what Gumlink was interested in exhibiting on their stand. A third strategy would have been to distribute the interaction to multiple users in a way where individual users were smaller "targets" during their interaction. Patterns of movement of multiple visitors and staff within the Gumlink stand could have been tracked using this as input for the display, or every single bypassing visitor could have been tracked, thus making everyone part of the spectacle. Each of these three suggestions for possible redesigns distances the user from being an obvious performer on a stage, because the interaction is moved from being expressive to being magical (cf. Reeves et al. [2005]). One possible drawback is that spectators (i.e., possible users or performers) never realize that they can become performers; that everyone believe the installation is a prerecorded video like most other visuals on a convention stand. In this case the real drawback would be that Gumlink—on a communication level—is transformed from being innovative (which is their

raison d'être) to being like every other company trying to sell new concepts at the convention. Consequently, a redesign has to preserve or even enhance the spectacular part of the installation while reducing the expositional expression currently dominating the installation's form.

Reviewing the design process in light of the concept of performing perception, the major design challenge in this case can thus be construed as the overcoming of this dilemma: Gumlink need an exhibition stand that will stand out, draw in visitors, and signal technological innovation and foresight; at the same time, it is highly problematic to engage visitors due to the socio-cultural codes for behaviour and self-representation.

Regardless of which strategy one applies for rethinking the installation so that it takes the user's performance of perception into account, a rethinking of the interplay between user-system interaction and spectator experience is crucial. The goal of the Gumlink installation was to attract potential customers by providing an experience that would not only be fun for the participant but also be an interesting and alluring experience for the spectator. As Reeves et al. [2005] states, spectators can be enticed into queueing at an installation by the user's performance in several ways, but our experiences with the Gumlink installation and the artworks analyzed earlier on, show that the expressive and suspenseful interaction strategies are particularly performative and have to be thought of as a specific category of performative interaction because they involve a more literal performance of the user. This category is important but also especially difficult, when designing eye-catching installations for noninformal settings as the pressure on the participant performing will be perceived as relatively higher when business relations are at stake. So when it comes to redesigning an installation like the one at the Gumlink stand, it can not be done by only taking into account the terminology offered by Reeves et al. [2005] even though the paper offers a nice framework for determining the spectator's experience. The reason for this is that the concept of performing perception seems to dominate the user's interaction strategy and consequently her actions, and if this performative aspect is not taken into consideration, spectators will have nothing to queue for as there will be no users tempting them.

5. SUMMARY

Our aim in this article has been to establish a background for understanding how and why the user's performing of her own perception is a central facet of aesthetics of interaction. The main contribution of the paper is to articulate and describe how *performing perception* can be used as a term to describe how the user is simultaneously engaged in three actions: the *act of interacting* with the system, thus understanding which possibilities she has and how she can operate the system; the *act of perceiving* the relation between her and the system and her and the surroundings; and finally the *act of performing* where she is a performer for others to observe. These three actions can be mirrored into three roles enacted simultaneously by the user: the *operator* of the system, the *performer* for other people present, and the *spectator* of the action in her immediate surroundings. Through analyses of various examples, we have demonstrated

how this 3-in-1 is always already shaping the user's understanding and perception of her interaction and we have shown how it seems to be staged through her experience of the object's form and expression in the social context in which it is experienced.

The notion of the user as a performer is gaining ground within HCI as understanding and designing for experience oriented uses of technology in public is becoming increasingly popular. However, many prototypes seem to be received differently than the designers expected despite having been very consciously designed for interesting and fun experiences.

The inspirations for the framework presented in this article has come from two disciplines: dramaturgical sociology and performance theory. From sociology, we lean on Goffman's accounts of how social interaction is always situated and how people in the same situation always influence each other's behavior. Most importantly, Goffman's account for focused and unfocused interaction proves to be important when we want to understand how interactions take shape from the social situatedness. Goffman found inspiration for his theories in theatre and performance theory, which in itself proves to be important for the notion of the user's performing of her own perception. Performance and theater theories are further relevant because they deliver basic understanding of how different roles work together. With these accounts in mind, it becomes easier to analyze the situation in which users have to navigate different roles played out as they interact with the system.

Of the examples presented in this article, many are contemporary artworks that—as an important part of the object's form and expression—carefully stage the tensions between looking and being looked at, between contemplating and interacting, and between being a performer and being a spectator.

Based on our theoretical and art-analytical endeavors, we finally analyzed three different cases according to how users engage with interactive systems in public. The analyses were carried out in order to bring the considerations into play, thus demonstrating how the 3-in-1 of user roles—and particularly how performing perception—shapes the user's experience. Having analyzed user roles in physical games and mobile space respectively, we have tentatively addressed the question of how to take these considerations into account when designing. It is not within the scope of this article to propose new design methods, but we end by bringing in suggestions for possible strategies in order to demonstrate operational consequences of designing with the performance of perception in mind.

REFERENCES

- AARSETH, E.J. 1997. *Cybertext: Perspectives on Ergodic Literature*. Johns Hopkins University Press, Baltimore, MD.
- BELLOTTI, V. AND BLY, S. 1996. Walking away from the desktop computer: Distributed collaboration and mobility in a product design team. In *Proceedings of the 1996 ACM conference on Computer Supported Cooperative Work* (Boston, MA, Nov. 16–20). G. M. OLSON, J. S. OLSON, AND M. S. ACKERMAN. Eds. ACM, New York.
- BELLOTTI, V. AND DOURISH, P. 1992. Awareness and coordination in Shared Workspaces. In *Proceedings of the 1992 ACM Conference on Computer-Supported Cooperative Work* (Toronto, Ont., Canada, Nov. 1–4) M. MANTEL AND R. M. BAECKER. Eds.

- BENFORD, S., CRABTREE, A., REEVES, S., FLINTHAM, M., DROZD, A., SHERIDAN, J., AND DIX, A. 2006. The frame of the game: Blurring the boundary between fiction and reality in mobile experiences. In *Proceedings of the Conference on Human Factors in Computing Systems (CHI'06)*, (Montréal, Québec, Canada). ACM, New York, 427–436.
- BENTLEY, E. 1964. *The Life of the Drama*. Atheneum, New York,
- BRISSETT, D. AND EDGLEY, C. 2006. *Life as Theater: A Dramaturgical Sourcebook*. AldineTransaction, New Brunswick, London.
- CROSS, M. 2006. *Bridge*. Exhibited at the exhibition space Dilston Grove, Cafe Gallery Projects London, London, UK (Oct.)
- DOURISH P. 2001a. Seeking a Foundation for context-aware computing. In *Human-Computer Interaction, 16 (2-4)*. Lawrence Erlbaum Associates, 229–241.
- DOURISH, P. 2001b. *Where the Action Is: The Foundations of Embodied Interaction*. MIT Press, Cambridge, MA.
- DOURISH, P. AND BUTTON, G. 1998. On technomethodology: Foundational relationships between ethnmethodology and system design. *Human-Computer Interaction 13*, 4, 395–432.
- FORLIZZI, J. AND BATTARBE, K. 2004. Understanding experience in interactive systems. In *Proceedings of Designing Interactive Systems (DIS) 2004*, (Cambridge, MA) ACM, New York, 261–268.
- GOFFMAN, E. 1966. *Behavior in Public Places; Notes on the Social Organization of Gatherings*. Free Press of Glencoe, New York.
- GOFFMAN, E. 1959. *The Presentation of Self in Everyday Life*. Doubleday Garden City, New York.
- GRUDIN, J. 1990. The computer reaches out: The historical continuity of interface design. In *Proceedings of the Conference on Human Factors in Computing Systems (CHI'90)*, ACM, New York.
- HALLNÄS, L. AND REDSTRØM, J. 2001. Slow technology—Designing for reflection. *Personal Ubiquitous Computing 5*, 3, 201–212.
- HARE, A. P. AND BLUMBERG, H. H. 1988. *Dramaturgical Analysis of Social Interaction*. Praeger, New York; Westport, Connecticut, London.
- IACUCCI, C., IACUCCI, G., WAGNER, I. AND PSIKA, T. 2005. A manifesto for the performative development of ubiquitous media. In *Proceedings of the 4th Decennial Conference on Critical Computing: Between Sense and Sensibility* (Aarhus, Denmark). ACM, New York, 19–28.
- ISHII, H. AND ULLMER, B. 1997. Tangible bits: Towards seamless interfaces between people, bits and atoms. In *Proceedings of the Conference on Human Factors in Computing Systems (CHI'97)* (Atlanta, GA). ACM, New York.
- LAHR, J. AND PRICE, J. 1973. *Life-Show; How to See Theater in Life and Life in Theater*. Viking Press, New York.
- LAUREL, B. 1991. *Computers as Theatre*. Addison-Wesley, Reading, MA.
- MALIA, J. 2006. *Private Public*. <http://www.interaction.rca.ac.uk/people/alumni/04-06/joe-malia/projects/project3.html>.
- MATTHEWS, K. 2006. *Sonic Bed*. Exhibited at OK Zentrum, (Linz, Austria). Ars Electronica Festival, September.
- MOEN, J. 2005. Towards people based movement interaction and kinaesthetic interaction experiences. In *Proceedings of the 4th Decennial Conference on Critical Computing: Between Sense and Sensibility* (Aarhus, Denmark). ACM, New York, 121–124.
- MURTAGH, G. M. 2001. Seeing the ‘rules’: Preliminary observations of action, interaction and mobile phone use. In *Wireless World. Social and Interactional Aspects of the Mobile Age*. Springer-Verlag, London, UK, pp. 81–91.
- ORR, J. 1990. Sharing knowledge, celebrating identity: Community memory in a service culture. In *Collective Remembering: Memory in Society*. Sage Publications.
- REEVES, S., BENFORD, S., O’MALLEY, C., AND FRASER, M. 2005. Designing the spectator experience. In *Proceedings of the Conference on Human Factors in Computing Systems (CHI'05)*. ACM, New York, pp. 741–750.
- SUCHMAN, L. 1987. *Plans and Situated Actions*. Cambridge Univ. Press, New York.
- VAN BOERDONK, K., SCHWACHÖFER, J., AND TIEBEN, R. 2007. *TouchMeDare*. /d.search-labs, Technical University of Eindhoven.

Received March 2007; revised January 2008; accepted January 2008

ACM Transactions on Computer-Human Interaction, Vol. 15, No. 3, Article 13, Publication date: November 2008.