Interaction design as understanding and transforming place

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Abstract
Space becomes place through a rich interplay of actors, actions and associations, and techniques drawn from performance, gaming and architecture are well adapted to helping us understand and design for complex environments. Our experience working with masters-level interaction design students in the ATELIER project has demonstrated that these ‘cross dressing’ techniques can create a climate of awareness in which inspirational learning and innovative design can occur.

Keywords: augmented environments, design communities, inspirational learning, ubiquitous computing

1 Embodiment and interaction
Mechatronics, sensors and radio frequency identification (RFID) tags inhabit new environments built upon networks of semi-autonomous objects, in which information can be spatially configured. Ubiquitous computing is perhaps the most common name for this state of affairs. It is a great challenge, however, to integrate new technologies into complex, convergent systems. It is clear that new interfaces call for an understanding beyond the purely technical. Augmenting spaces and artefacts is also a process of supporting shared understanding of the social activities taking place in different contexts. These environments are not limited to workspaces, but also include public and domestic spaces. The Central Station in Malmö is one example of a place that has emergent qualities, that is more than the sum of its different communities. A challenge for ubiquitous computing is to integrate computation with existing artefacts, physical space and the social meaning-making taking place within the environment.

While abstraction is one of the strengths of computation and digital media, it is obvious that users are more than just information processing systems. The relationship between information and knowledge is one example of how meaning is not inherent in information, but rather made meaningful by direct participation in the world. Paul Dourish introduces the notion of embodied interaction:

*the creation, manipulation, and sharing of meaning through engaged interaction with artefacts.* (Dourish 2001)
A shift towards embodied interaction is called for by the recognition that incorporating human skills requires moving computation ‘out of the box’ and ‘into our environments’. Digital artefacts are not primarily representations, but participate actively in the world.

The HCI tradition has developed various methods for evaluating qualities of use. Centred upon efficiency, ease of use and learning, these methods fail to adequately incorporate aesthetic experience and socially meaningful activity into the design process. In many cases qualities of use are different from those imagined by the designer. Hallnäs and Redström define this shift of perspective as being one from use to presence. Presence is something different from just being physically present. It addresses the way we let artefacts inhabit our lifeworlds on a more existential level. Clearly there is a distinction between describing a table as something “inherited by my grandfather” and “a piece of furniture that can bear X kg” (Hallnäs and Redström 2002). The difference is essential, but also difficult to evaluate in objective terms.

What constitutes place is a complex totality of social engagement with other people, use of artefacts, information and lived experience that is hard to pinpoint. Design is a process of both recognising and transforming place. But place is a qualitative phenomena more than quantitative. The phenomenological tradition gives us some tools to approach everyday life by returning to concrete things and occurrences rather than abstractions describing them. Bread on a table is not a meal—it’s also the hands weary from a full day’s work dropping the knife, the children telling stories from school, the remembrance of youth in the taste of a familiar dish. This richness is hard to generalise in descriptive language. Our everyday lifeworld consists of this concreteness that falls between the pure objects of scientific inquiry. Understanding place calls for collecting and cherishing the paradoxes and complexity of lifeworlds, rather than unifying them in abstractions.

2 Research context

Over the past several years we have been exploring the way in which space becomes place through the EU-funded ATELIER project, in collaboration with Masters level students in Interaction Design at Malmö University’s School of Arts and Communication (K3). ATELIER aims to make a contribution to our understanding of inspirational forms of learning and the creation of augmented educational environments for architecture and interaction design studies. Further, ATELIER provides a technological infrastructure that allows for the fluid capture and manipulation of media and design representations, with the goal of supporting innovative design conceptualisation and learning.

ATELIER researchers have participated in two extended projects with the graduate students: Augmenting spaces (Fall 2002), and Semipublic places (Fall/Spring 2003/04).
In the former, students developed proposed interactive artefacts and services for four different host companies/agencies; in the latter students prototyped spatial augmentations for Malmö’s Central Railway Station. Besides engaging the Master’s students in concrete design activities in connection with real world users and contexts, both projects were conceived of as providing them with a ‘toolbox’ of different interaction design methodologies. Several of these methods were drawn from practices coming from outside of traditional digital systems development, specifically exploratory games, performance and illumination, and mixed-media objects as architectural models.

3 Methods

3.1 Exploratory games

If we choose to work with interventions in the design process, and focus on design as a proactive and transformative practice instead of simply adding incremental pieces of support to existing processes, we must be well acquainted with a range of design strategies. Within the participatory design community, as well as the computer-supported-cooperative-work (CSCW) tradition, a lot of effort has been put into techniques using ethnography as a means of informing design. Descriptions of practice tend to be rigid, and overly respectful of the demand for objectivity in the use of language. The clarity thus achieved can be viewed as a sincere respect for the users and their working conditions. But ambiguity can also be used effectively in a respectful way that invites different perspectives.

While analysis can be interesting and engaging, participation in games that aim at design improvements requires having fun. In recent years, more speculative methods for inquiry and collaboration, inspired by domains other than science, have been explored. Several art movements have developed generative methods for collaboration using game forms that take place during face to face interaction. Originating from the idea of autonomous writing, the surrealists borrowed methods from academic disciplines such as sociology, anthropology and psychology to elaborate methods in the form of games for exploring the mechanism of imagination and intensifying collaborative experience. They subverted academic modes of inquiry to undermine rationality, and invented playful procedures to release collaborative creativity. For example, the game of Exquisite Corpse made use of open ended fragments. Drawings were made on a piece of paper that were folded in a way that showed only a part of the drawing and the next player continued the drawing on basis of what he could see and then passed it on to the next player in a similar way.

In Malmö we have (even before ATELIER) used card games as a participatory design technique to generate shared narratives and explore what’s happening in a place. The ‘playing cards’ are augmented with RFID tags that maintain links to videos and images collected in field studies. A goal for the games is to set up imaginary situations that complement reflective understanding of practice. While the media attached to the cards were from the project at hand, players are free to interpret them in any way they want.

In the first round of one possible game, all cards are placed on the RFID tag reader, and the digital content is thus displayed (Figure 1). The first player places a card on the table and gives a tentative title to the story that is to be built. The second player will also play one card and continue to develop the story. A player can also pass, just as in poker, if they feel uncomfortable with the story or if their cards do not match. After the second player the third continues and so on. The game is played until there is a story on the table.

Figure 1. (left) A plastic card; (right) the card is placed on the tag reader, which then plays the digital media in a large projection that can be viewed by everyone.
that the group feels is valid and a consensual narrative has been formed (Figure 2). The open ended nature of the cards in our game is of course the foremost reason for complexity of interpretation, but at the same time the strength. They are representational artefacts and they carry a portion of evidential content.

Augmentation of the cards is crucial. They are not symbolic game pieces, but before being placed on the table and into the story the content (video clips, still images) must be displayed to everyone in the game. But they are not stereotyped statements; rather they are placeholders for different voices and try to create situations where different perspectives can meet. The mesh of different professional, social or ideological perspectives and interests is typical for design processes. Many professionals and researchers have made interesting work on different methods for using objects as mediators in participatory design processes (Star 1989, Gaver et al. 1999 and Saunders and Dandavate 1999). It is not only a question of blending the different perspectives, but also of creating a situation where the participators can step in and out of their own perspective. While watching, the media participators can immerse in their memories of the occurrences. As the conversation continues they can reflect on what has been viewed from (what has been coined as) an ‘analytical distance’. The core of the game is to try to build on visions of the others. The final story lies ahead and must be negotiated.

The ‘passing it on—catching it’ nature of the storytelling allows different stories being told on the actual observations, but they do not explode in any direction. As the game succeeds the group narrows down a version of the story, and the rule that says that some cards can be exchanged at the end of the story increases the experimental space. This version of the games starts out with dealing the existing cards evenly between the players. The first player starts to tell a story built upon their ‘hand’ of three cards. The following players can add any of their own cards to continue the story. When all cards are on the table a joint evaluation takes place and some cards can be changed or withdrawn. The continuous flux has also been the model for the archetypical narrative form of digital media. Networked nonlinear narratives have many predecessors from the Chinese oracle text I Ching to Joyce’s Finnegans Wake. A goal for the games is to set up imaginary situations that complement reflective understanding of practice. They do so by introducing a playfulness that follows from the non-constraining use of language. The use of games as mediating tools in participatory design processes has been explored, for example, by Ehn and Sjögren (1992). They argue against correctness of descriptions and focus on how linguistic artefacts are used rather than what they state to be true. Meaning arises not in how exactly a statement is formulated, but rather by the

Figure 2. (left) Cards laid out which are eventually formed into a commented story—such as the illustration (right).

Figure 3. In the latest version of the game, the displayed media can be manipulated directly by clicking, dragging and resizing images projected on a tabletop surface. The different fragments can be clustered into thematic groups, thus forming design stories.
3.2 Performance and illumination

In the summer of 2000, students and faculty in the New Media Design program at Art Center College of Design (Pasadena, CA) gathered for an improvisational design workshop led by Brenda Laurel (Laurel 2003). Improvisational design combines ethnographic video research methods with practices drawn from theatre improvisation, with the goal of critiquing existing work practices and situations of use, as well as generating new possible design solutions. Contexts chosen by the Art Center students for exploration ranged from a public car wash, to restaurants and shops.

One group captured video of counterworkers at an ice cream shop. The resulting footage was studied, memorised, and ‘played back’ physically through improvisation in a theatre environment. What we learned was that not only was the work environment in the shop uncomfortable to navigate in the course of making an ice cream cone, but opportunities were lost to make the act of creating the cone more of a performance. Counter workers were being denied a form of self expression. Ice cream is a wonderful medium, colourful, with a great sense of plasticity. Clearly, the potentials within the experience of ice cream cone making and spectatorship were not being fully exploited.

What we discovered is that the theatrical techniques themselves helped focus the workshop participants upon the performative potentials inherent in the work tasks. We then generated proposals for how an ice cream retailing environment could support its own kind of performances. One proposal took a musician’s drum kit as inspiration, centring the counter worker among tubs of ice cream suspended at different levels, allowing her to spin between the different flavours in the course of creating a cone. Another employed a dairy metaphor, and proposed mounting (perhaps transparent) containers of ice cream from above, where they would hang like giant udders ready to be milked onto a cone by the ‘soda jerk’.

In both *Semipublic places* and *Augmenting spaces* we ran similar improvisational design workshops, combining ethnographic practice and performance, with the goal of encouraging the students to engage in a directly physical, felt way with the life of people potentially affected by their designs (a means of ‘getting practice under your skin’). Students set out with video cameras...
to capture footage of an inhabitant of their design context engaged in an activity. The resulting material was then back-projected upon a large screen in the ATELIER studio, and the students rehearsed ‘playing back’ the gestures and movements by memory through their own bodies (Figures 4 and 5). Improvisational design (or ‘body mimicking’, as we called it) was demonstrated to have the potential to generate critiques of existing work environments and sequences, as well to suggest new opportunities.

Another theatrical technique we worked with in the Augmenting spaces project was to explore the potential for illumination to inflect use qualities. In this exercise, students analysed the illumination qualities present in their host context. The group working with the emergency room unit at the Malmö General Hospital, for example, identified soft, flat lighting coming from above (mostly fluorescent tubes) as the predominant light in their use context. They then recreated as closely as possible in the studio the opposite illumination qualities (hard, directional light coming from below, not unlike a discotheque or stage set). Their existing physical prototype was then videotaped under these conditions, as a means of exploring the way in which their sense of the prototype was changed by the new illumination conditions. Though the extreme conditions of the ‘opposite’ type of illumination would probably never be replicated in reality, the lesson the students learned is that the qualities of surrounding light, so often taken for granted, have great power to effect the way in which a prototype object is perceived and handled (Figures 6 and 7).

3.3 Mixed-media objects as architectural models
Within the ATELIER project we believe that mixed-media objects can work as a powerful design resource for illustrating and sharing project relevant knowledge and for supporting collaborative work. A mixed-media object
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is a tangible object augmented by a digital representation. The linkage between the two is provided by an RFID tag or barcode, and the representation exists as an image, sound or video file in a hypermedia database. Inspired by how architecture students work with abstract and detailed scale models, we believed a mixed-media model could be an interesting way for the interaction design students to explore and get an overview of Malmö Central Station in the *Semipublic places* project. The model was build out of whatever materials were available in the environment, and then augmented with RFID tags in the places were digital material was captured at the station.

As a tool for initial dialogue and informal sharing of insights and reflections it worked quite well, as everyone seemed to relate to the place in very concrete ways. It also highlighted all the places and information that were still undiscovered, and thus worked as a tool for deciding what to do next, and how to divide the space and future studies among the students. The combination of spatial overview and specific representations of visual or aural characteristics of the space also made the textural contrasts between different zones of the station immediately apparent, which was annotated on *Post-it* notes by everyone (Figure 8).

A further use of the model was through projected mappings. ‘Mappings’ are inspired by architecture and city planning, and the method was introduced to the interaction design students in the very beginning of the *Semipublic places* project as a means of annotating observations in the context of their study in this case at Malmö Central Station. Before going on the field trip they gathered a 2D top view plan of the site, some sheets of semi-transparent paper and a selection of coloured pencils used to add annotations and indicate different perspectives on the papers. They were told to choose a variety of perspectives for their observations such as

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**Figure 8.** The mixed-media model after an initial exploration with *Post-it* notes indicating interesting observations and issues.

**Figure 9.** Public—semi-public—private zones at Malmö Central Station, as they were observed and experienced by some students. Here projected onto the mixed-media model.
means of transportation inside and outside the station’, ‘private—semipublic—public places/zones within the station’, etc. (Figure 9).

Annotations were done on the fly, and then they were further refined and analysed back in the studio, by overlaying different types of mappings, and by digitalising them and projecting them onto the mixed-media model (Figure 10).

4 Design outcomes

Successful design education pedagogies are difficult to evaluate quantitatively; we prefer instead to submit design outcomes as evidence that our ‘cross-dressing’ methodologies have created a learning experience that supports innovative thinking and making.

In the case of the Semipublic places project, students produced two interactive installations that were exhibited at the Malmö Central Railway Station in February 2004. Both installations reflected an awareness of the station as semi-public, a transitional place between private, domestic spaces and the more public sphere of work or travel.

In the first, Refrigerator poetry, passers-by were invited to compose phrases or poems on a large public ‘fridge’ door. Using barcode readers, the visitors were able to output their poems in one of two ways: either privately printed out as a postcard, or else publicly projected on a wall within the station (Figures 11 and 12).

This installation transposed a domestic form (as well as a surrealist practice) to a public space, while granting visitors the freedom to express themselves either publicly or privately.

The second installation, A room with a view, allowed visitors to the station to retreat within a tent-like structure, upon which a webcam view of the passing crowd was projected (Figure 13). By manipulating a large, basketball-sized trackball, the visitor was able to control the focus of the projected image (Figure 14).

5 Conclusions and lessons learned

Interaction design, a relatively new discipline, is in a state of constant re-evaluation of the methods and material used in the design processes. As an emerging discipline, there is a need to develop a unique discourse that can help to generate transferable design knowledge. However it is obvious that the designer differs from the scientist when it comes to requirements for knowledge production and methodological frameworks. Interaction design has a number of properties that differ from other design fields. With digital technology, we can build temporal structures and behaviour. In designing these
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The making of digital artefacts therefore, by necessity, incorporates a rich interplay, in which scientific considerations are troublesome but important. Industrial designer Klaus Krippendorf (1995) makes some important points concerning a discourse of design:

• design discourse does not rest upon facts, but is proactive;
• design concerns the meanings artefacts can acquire through use, rather than those that inhere in the artefact itself;
• a design discourse must be defined on its own.

These points inform the often awkward relationship between design and research. Design involves pro-searching more than researching. Our understanding is of a second order, in the sense that it’s not the designer’s appreciation of artefacts that matters but rather the user’s (an understanding of an understanding). Ideas from other fields can help, but can also introduce parasitic paradigms into the discourse. One example of that is the fascination for measurability, which has heavily influenced the HCI tradition.

The design of interaction is not about creating products; we work rather as directors of experience. To view computation as composing in time is to acknowledge that we can view time as form, and it also implies that we can turn to film and music for inspiration rather than ideation by drawing. The designer can in many ways be seen as part of a self-organising system, searching for solutions and ideas while at the same time reflecting on practice. While reflecting, the designer must at the same time also be creative in her use of methods.

Designing for positive user experience in interactive systems benefits from the practices within other domains, such as theatre and art, which have rich traditions of both creating and evaluating experience. We have here described a couple of instances where we have ‘borrowed’ methods from other disciplines.
We have integrated these methods into educational projects over the past two years with some successes. More importantly, we have gained insights into how the techniques can be more effectively deployed in the design education process. One limitation in our capacity to evaluate the usefulness of these techniques is the fact that they are presented in the context of a foundational course, in which a ‘toolkit’ of diverse design methodologies are introduced as part of a larger design project. We were thus deprived of the opportunity to create rich, custom tailored contexts for each technique (the improvisatory workshop at Art Center, for example, included several weeks of improvisation and body awareness exercises that were not replicated in Malmö). Although the game, performance and architectural techniques have thus not been individually linked to design outcomes, we have conducted debriefings of the students following the projects, and have acquired anecdotal evidence confirming the usefulness of the methods.

It is clear to us that techniques coming from outside of traditional design and systems development help create a climate of awareness in which more innovative work can be done. As an example, although the ‘body mimicking’ exercise did not always have a discernable impact upon the final development of design concepts, students did testify to a new awareness of the importance of body rhythms in understanding the use qualities of designed objects. The students went on to suggest ways in which the perception of work rhythms in the body mimicking exercise could be enhanced through the use of music as complement or counterpoint to the unique beat established by different sequences of movements and gestures. A similar response emerged when we asked students to reflect upon the illumination exercise. Performative techniques in and of themselves draw attention to opportunities for performance and spectatorship in our working and daily lives, and design techniques that draw upon game
forms and motivations can similarly make us aware of new possibilities for playful response to our environment. Finally, architectural techniques employed in the mixed-media model sharpened our students’ awareness of ways in which space is and can be organised, and the difference between abstract spatial descriptions and what it means to represent richly inhabited place.

One area in which we need to work further is in the timing of these different techniques within a design process. We occasionally experienced difficulty establishing the correct focus upon the mixed-media model; it remained more of an object to be finished than a tool with which to think and conduct analysis. This partly resulted from the fact that the model was constructed early in the design process, as a foundational research exercise before team building and concept development began. We have also acquired a fair amount of experience with card games as a means of reflecting upon the design process in debriefing sessions, but have worked less with the technique as a generative method within the ATELIER projects.

However, our experience with these ‘cross dressing’ techniques has been positive, and we look forward to the development of an enhanced design ethos, in which designers will intuitively be able to shift fluidly from technique to technique as appropriate, just as they would match their wardrobe to their plans for the evening.

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**Notes**

1 The introduction for *Semi-public places* states: The Malmö Central Train Station is in a state of change. The opening of the bridge to Denmark in 2000 transformed the station from a destination of primarily domestic travel to a new international gateway and an important hub for commuting to and from Copenhagen. Conversely, the inauguration of the Malmö tunnel project in 2010—with the introduction of intermediate stops between Copenhagen and the Central station—promises to alter the patterns of usage of the station, as people embark and disembark from metro stops nearer their homes. But the character of the station has never been fully defined just by the brief passage of harried commuters. The Central Station has also historically served as a destination in itself and a place of significance for private lives. In Henning Mankell’s thriller *Mördare utan ansikte* (Murderers without faces), for example, the protagonist and his estranged wife chose to meet at the station for a drink, and play out a scene of great emotional vulnerability. Every day, in fact, the station is the site of intense experiences of separation and reunion. The station can thus be said to be a quintessential example of a semi-public place.

As an SPP, the Central Station functions as a locus of commerce, travel, administration, and entertainment activities, populated by a diverse group of commuters, travellers, merchants, government officials, and inhabitants of the surrounding community. It also serves as a transitional space, through which people move—and gradually adapt—from their home environments to the public sphere of work, taking on new roles and behaviours.

Previous design projects directed towards public facilities such as train stations and airports have
tended to focus upon the experience of travel as a means of proposing spatial augmentations and new digital services, but we believe that this approach is too limited to benefit the Central Station. One strength of interaction design practice is the capacity to extract meaningful information from the experience of individual users, and thus build up a nuanced picture of a complex environment.

References


Mette Agger Erikesen is an architect who specialised in communication design at Aarhus School of Architecture in Denmark. She has recently been working on three different EU-funded Disappearing Computer projects—workSpace, ATELIER and Palcom. The working title of her PhD project is Materially grounding imagination—ways of supporting intense interdisciplinary design work. The project explores, both through observations and interventions, how various ‘materials’ can support interweaving concrete field and design work for interdisciplinary dialogue and design-oriented collaboration.

Per Linde has studied interaction design and philosophy. For the past 2 ½ years he has been involved in the EU-funded Disappearing Computer projects ATELIER and Palcom. His research concerns ubiquitous computing with a special focus on how interactive technologies can support temporary instances of individual or collaborative place making. He has his background as a poet.

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