

# Urban HCI – Interaction Patterns in the Built Environment

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**In this paper I describe my doctoral research on urban interaction design. The objective of this work is to explore and conceptualize principles for the design of Shared Encounters. By accounting for the relevance of relational and social space a new thinking different from Ubiquitous Computing can emerge.**

*Urban HCI, Shared Encounters, Media Façades, Interaction Patterns, Social Space*

## 1. INTRODUCTION

Media Technology has been integrated in the spatial dynamics of the city along two dominant axes of spectacle and surveillance [12]. Sensors track our movements and open doors, GPS enabled mobile phones notify us for various reasons and urban screens track our faces to present consumer messages to us. Both patterns seem to be rather passive and there is not much for the recipient to do but accept it.

However, there are approaches in new media art and HCI that investigate interactive possibilities in the urban environment [3, 5, 6, 8, 9, 11, 13, 16] which enliven public space as well as involve, integrate and activate city dwellers instead of pushing them into a passive role. Most of these explorations have a playful character, but there are more directions to explore that hold the potential to create new ways of interaction. E.g. interactive concepts may cultivate social values, spark political discourse, create shared or mediated encounters, promote cultural activism, activation, participation and involvement. In a similar way to Sennett in his book “The fall of public man”, I am exploring new ways of interaction that support social aspects instead of single user displays (e.g. mobile apps). My work explores Interaction Patterns that emerge when bringing new media technology into the public space and the built environment. I argue that these two elements; the architectural and the public behavioural demand different interaction paradigms than the desktop-metaphor. Rethinking the relation between public life and urban space in HCI will help to create new perspectives and applicable technical solutions for the future digital master plan for our urban environment.

Urban Screens form an area where policy-makers in many cities have been largely inert. This inertia leaves space for others, including the cultural sector, to innovate [12]. One of these cultural initiatives is the Media Façade Festival founded by Miriam Struppek [18] in which I and the VR/Urban collective [7], of which I am part, have been involved with two urban interventions called Spread.gun [9] and SMSlingshot [8].

Our original ambition with these Urban Interventions was to point out and counter the increasing privatisation of public spaces through technology. We give the public access to Media Screens and digital façades by opening up the medium and giving people a tool which enables them to create their own content in form of personal messages or statements that can be ‘shot’ via Spread.gun or SMSlingshot to the connected façade. From this starting point several theoretical considerations have emerged that I currently summarize as interaction patterns that are only likely to occur in urban space. This means the use of urban space and its setting respectively situation becomes a crucial element of design in human computer interaction research. In the architectural domain, Alexander presents the fundamental building blocks in his book “A Pattern Language: Towns, Buildings, Constructions” that may now become means of interaction design. Whereas Goffmann [10] with “Behaviour in Public Places” and Michael de Certeau [4] laid the foundation in the social realm and Augoyard is already analyzing the interplay between the architectural and social life and identifying explicit figures of walking in [1].

However, apart from the surveillance and spectacle pattern, which have been discussed by McQuire [12] and extended by Andersen’s Software-City

Patterns, I have identified two more during my work with SMSlingshot. These patterns will be the subject of my further investigations and hopefully lead to a better understanding in Urban HCI and possibly form a framework for Software Engineers and Interaction Designers that will help them to positively influence hybridization of social life and behavior in urban space.

## 2. A QUICK OVERVIEW OF EXISTING MODELS

In [2] Brignull and Rogers discuss two transitions a potential user of a large public display has to make in order to become an actual user. It is argued that some encouragement is needed to make the user cross these thresholds. However, with SMSlingshot I experienced that these kinds of encouragement or enticements are not really needed. It was somehow already embedded in our interaction design.

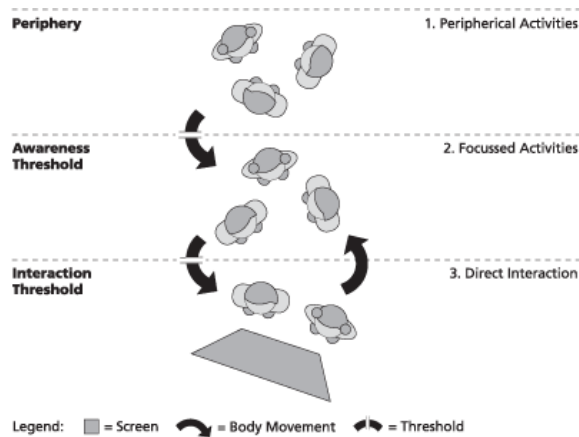


Fig. 1: Brignull and Roger's Model of Public Interaction

Reeves [14] and Finke [6] offer an alternative view on interaction with large public screens, focusing on people's roles rather than activities. This mirrors my concern to speak about users in urban situations. The user is a 'dynamic' person that can switch between the roles of a performer, spectator / observer or by-stander. This illustrates that we have multiple design tasks and are not designing for the universal user.

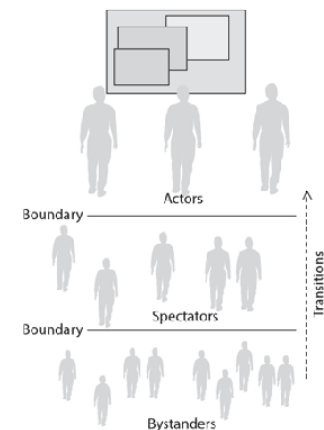


Fig. 2: Role-Centred Model

## 3. MY WORK SO FAR

In 2010 the SMSlingshot installation has been shown in various places with different settings and situations. The installation has been shown at an art festival (White Night, Riga 2009), indoor exhibition (Technical Museum, Berlin 2010), conference

demo context (TEI, Boston 2010, Contemporary Museum of Art, Mallorca 2010), conference talk (TEI 2010), a theatre award ceremony (Sao Paulo, FILE 2010), a pedestrian walkway (Sao Paulo 2010, Eindhoven 2010) and plaza situation (Media Façade Festival, Madrid, Liverpool and Berlin 2010), and within a branded space (Museumsquartier, Vienna 2010). As well as the changing context of venues and experiencing all the possible challenges identified by Daalsgard [5], the spatial setting was unique to each place.

I identified differences in interaction quality of screens that go to the ground in contrast to screens in a raised position. There are differences in plaza settings versus pedestrian walkway interventions and scale related differences. E.g. in the few indoor interventions where the projection is usually relatively small, the performer's affect seemed to be lower. On the other hand, the conference situation led to greater affect for spectators, than is generally perceived in outdoor situations. Another assumption related to the encouragement problem mentioned by Brignull is that the possibility to compose a personal message on the SMSlingshot screen and have it reviewed and discussed with bystanders (friends) reduces embarrassment, because the message is already 'accepted' by them and making the message public is now unlikely to lose face in front of them. A surprising observation was the 'paradox of nice behavior'. Even so we gave the people the license to misbehave and sometimes tried to encourage them to be more progressive, no messages were inappropriate or insulting. Most of our interventions have been videotaped to review interaction patterns and to identify effects that bear a certain design quality. The aim is to understand them in detail and to analyse their cause. We also logged the typed messages, which will be analysed to identify common content themes.

My current research interest lies in the development and clarification of the Ubiquitous Computing subset paradigm called Urban HCI. Is it different from Ubiquitous Computing? We need to define the problem domain and go on from McQuire's work 'The Media City' [12] that already investigates the history of this emerging field. Investigations of the Empowerment Pattern, Copy and Writing Pattern will hopefully lead to more insights in fusing new media with architectural and social space.

### 3.1 Ubicomp is not Urban HCI

The discussion about the relevance of space had already its peak in the Space and Place discussions of Harrison and Dourish. Space here refers to a context's physical configuration. Place refers to the way we are framed by social conventions and experience. The difference between both ways of thinking can be illustrated by comparing the case of SMSlingshot's with [15] where the ability to post

anonymous messages to a shared public screen resulted in a large number of messages with sexual references. With the SMSlingshot, the presence of observers and the blend of virtual and real space, as well as the real-time interaction promoted visibility of the performer and thus prevented such inappropriate messages a priori. Furthermore, we noticed a difference in plaza-based vs. walkway interaction during the SMSlingshot exhibitions. In plaza-situations, people tend to demand some kind of development in an art piece. It furthermore seems that narratives play a bigger role, while on the walkway a walk-up-and-use style might be preferred. This is an indicator of the influence of the built environment on interaction design.

### 3.2 The Empowerment Pattern

To analyze the impact of urban scale on the interaction, I categorized the situation in Eindhoven exemplarily as display and interaction spaces. It became obvious that an input interface is usually rather small and can hardly be perceived by spectators in contrast to the display space. While input and output spaces have similar scale in desktop or mobile applications, the difference is much larger in such configurations. This makes it hard to create an obvious link between interface and screen. In the design of SMSlingshot, only the affordance of the interaction device and the green laser that lights up when someone aims give cues about the linkage. Lab[au] who did an installation called 'Touch' at the Dexia Towers in Brussels seemed to have the same issue. In their case they 'established' the link by building a pavilion-like station in front of the media façade from where one was able to interact. The enormous size of the screen, but also the distance, renders models such as [19] and [17] non-applicable. However, a closer look at spatial relationships led to the assumption that the emotional effect for the performer is much higher the further away from the screen (e.g. standing in Zone 4 rather than in Zone 1 in Fig.3). I also had the impression of a greater 'feeling of empowerment', when observing people using SMSlingshot outdoors versus indoor.

So do urban interactive systems promote this kind of pattern? A third example apart from 'Touch' and SMSlingshot comes to mind; Raphael Lozano-Hemmer's work 'Body Movies' [11]. It links the input interface with the display space in a smart way by using the shadow cast by people against a façade. Not that people already know how to navigate one's own shadow, but also making them able to choose their own personal degree of prominence as a performer, makes this piece so successful. The interaction space is maximized and matches the scale of the display, harmonizing the overall experience. In addition, having the screen at ground level creates a tighter link to the projection. With SMSlingshot I observed that people also be-

gin to interact directly with the projection in this configuration. In one case a friend of a performer who was about to shoot ran to the screen in order to have his own body stencilled on the wall by the virtual colour "splat" that was about to approach.



Fig. 3: Affective Spaces (STRP Eindhoven)

### 3.3 The Copy Pattern

Another identified pattern is the Copy Pattern. This is a common interaction on desktop computers; this pattern was also observed during the SMSlingshot interventions. People photographed their own messages they had shot on the wall. While I had not predicted this, I found it quite logical, which led me to do a short analysis of the places where people do this. I searched Flickr's database around an area in Glasgow I know well.



Fig. 4: Cam-Copy Pattern

It turned out that this resource of information may be quite useful. The immanent interaction of taking pictures in urban space can be tracked down to an appropriate granularity. It showed that people (probably tourists) take a lot of photos of statues. At GOMA and George Square these were the predominant pictures, which might have implications when coding for space.

### 3.4 The Writing Pattern

A consistent digital writing pattern has not yet been observed in urban scenarios; even though graffiti is

a sociological phenomenon that exists since humankind. The main reason might be the protected access of public screens. Owners usually close them down and show their own content. It is all the more remarkable that writing on bulletin boards, forums, blogs and social website is more than welcome in the virtual world. Why does Urban Space conflict with this? This has not been further analyzed, but is something I find very important - in our increasing hybridisation of urban space one must have space to express oneself.

#### 4. METHODOLOGY

The methodology I use is phenomenological oriented and as such the epistemological outcome is inductively created. Urban HCI much like Situated Computing requires a multidimensional approach from multiple theoretical and empirical perspectives using triangulation to generate a useful framework to inform system and interaction designs of shared encounters. The perspectives taken align along the dimensions of HCI, Urban Computing and Architecture and Urban Planning. The phase of analysis hence deals with technical, social and design problems. But instead of analyzing each dimension separated in-vitro and assuming their non-interdependence, I employ experiential urban prototypes e.g. SMSlingshot as probes that synthesize identified concepts, e.g. the Empowerment Pattern found in the analysis phase, and test them against real world scenarios. This approach relates to the methodology of action research or research through design.

#### 5. CONCLUSION AND FUTURE WORK

In this paper I tried to outline a few aspects I encountered during my work with SMSlingshot that have led to the idea of inherent (Empowerment Pattern), existent (Copy Pattern) and not quite yet existing (Writing Pattern) interaction patterns in Urban Space. It is clear that the field of urban intervention is explored rather by artists and designers than by computer scientists (who focus more on technical issues that lead to ubiquitous solutions rather situated ones). However, the idea of an Empowerment Pattern illustrates that relational space might play a bigger role in the increasing hybridisation of space than has been anticipated. To avoid further inertia and withdrawal of the public into the private sphere, ways for a digital master plan needs to be explored. Digital systems that enliven the 'Polis', enable political discussions or promote social gossip, are needed. We actively need to construct digital situations and explore their effects. Urban HCI clearly demands new interaction paradigms that have only been discovered marginally. The telecommunication industry invented its own vision of interaction beyond the desktop, which

ended up in the "Anywhere, Anytime" paradigm that shackled a lot of computer scientists with its vision. My future work will try to clarify the Urban HCI paradigm and argue what is different from Ubiquitous Computing, thus defining the problem domain better and understanding it in more depth e.g. through cultural probes. Furthermore, I will investigate some urban patterns in greater detail, especially those that integrate the relational space with HCI (e.g. the Empowerment Pattern). It is also likely that new patterns are found through the design of new urban interventions, workshops, hardware and software tinkering and urban probes. Furthermore, an analysis of existing art installations related to Urban HCI and Shared Encounters may help to understand the role of space in Urban HCI.

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