

Using the critical design approach for rethinking citizens' emotional bond with urban spaces

A. Matassa^{1,*}, F. Venero¹

¹Università degli Studi di Torino, Corso Svizzera 185, 10149, Torino – Italy

Abstract

This paper focuses on the use of the critical design approach to analyze and understand the connection between human beings and urban spaces. Taking inspiration from the value that place and space have for people (e.g. for the construction of their individual identities) and from previous works concerning memories in the urban space experienced while cycling, we propose to undertake a design research where ambiguous and cognitively dissonant messages are delivered through a wearable device to encourage individuals to rethink and revalue their relations with space, consequently reshaping their personal identity.

Keywords: HCI, Wearable Computing, Bodily Experience, Urban Space, Memories, Ambiguity, Critical Design.

Received on 04 December 2014, accepted on 02 April 2015, published on 01 December 2015

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doi: 10.4108/eai.1-12-2015.150714

1. Introduction

We propose the use of critical design as a way to engage people to interact with urban spaces, and describe the design of a future empirical study aimed at validating our idea that altered memories can be used to stimulate people to rethink space and their relationship with it.

Our main inspiration comes from the work of Matassa et al.[39][40], where the authors designed, prototyped and evaluated a wearable device for tracking memories in the urban space by cycling. Usually, wearable devices are used for tracking information about human beings, especially in fields such as health, fitness and, partially, fashion and design.

Matassa et al.[39][40] tried to extend the scope of wearable computing using it to enhance the relation between city and citizens. Taking inspiration from the Senseable City Lab[37] theories and smart city guidelines [38], they designed a wearable interactive system aimed at encouraging cyclists to discover the town where they live.

In both their works, wearable devices were adopted to encourage a deeper relationship between personal identity and urban spaces, based on the ideas that a) space is an important element in the construction of personal identity, and b) linking personal memories to specific places can support a greater attention and care for urban spaces.

Leveraging these insights from their work, we propose to use a critical design approach to motivate people to reflect and rethink their experiences through the discovery of hidden meanings and new values in urban spaces.

We propose to carry out an empirical study to compare how real and altered memories stimulate users' reactions and influence their capability to recognize themselves in the urban spaces and in their memories related to the urban landscape.

The paper is structured as follows. At first, we discuss some related work. Then, we present the issue of building one's own identity in a scenario which is characterized by an overabundance of information. In the following sections, we envision a possible solution, discussing how the body can represent a sort of "natural device" to interact with space, and introduce the critical design

*Corresponding author. Email: matassa@di.unito.it

approach as a research method to encourage people's reflection about the role of space in their life. In Section 4, we present the design of the empirical study we are planning to carry out and discuss its expected results in Section 5. We conclude with some final remarks and a brief discussion of our future works.

2. Related Works

We start with a brief review of related works that study the issues of ambiguity in design. Then, we offer an overview of projects and works which deal with memory and personal identity, and show how these issues are approached in HCI.

2.1. Ambiguity

Ambiguity covers an important role in the design process. Even if there are many projects about the use of ambiguity in design, however, most of them mainly embrace a theoretical approach. Gaver et al. [22] show the potential value of ambiguity in design, defining it as a resource through which people can be disoriented and, thus, stimulated to reflect about the context and situation in which they are acting. They underline how ambiguity is far from vagueness, confusion, fuzziness or inconsistency. Differently, it is defined as "a property of the interpretative relationship between people and artefacts" [25]. In this sense, ambiguity is not intended as an attribute of things, but rather as a way in which users can perceive the value of things and objects.

Bell et al. [26] introduce the concept of "defamiliarization", an innovative design approach to engage users in a critical reflection process and to open up new spaces for the design of domestic technologies.

Aoki and Woodruff [27] use ambiguity as a tool for stimulating multiple interpretations of users' behaviour in a social situation. Chiang and Mitchell [28] propose an observational study about the use of ambiguity in interaction design as a "poetic device". Starting from Norman's model of interaction [48], they purposely apply ambiguity to the interaction model to stimulate aesthetic responses on the part of users.

Finally, ambiguity has an important role in interactive art. In Rokeby [29], there are some examples of how ambiguity can be used to encourage the creation of artworks in which he unleashes rich complexity and ambiguity through the complex relationships between artists and interactive artefacts, and between users and artefacts.

2.2. Memory

Memory is at the heart of the way most people think about their personal identity: past episodes provide a sense of personal identity and allow people to recognize and recollect themselves. There are many works that aim to

exploit the power of technology to encourage and stimulate the process of building one's own personal identity with particular attention to the context and environment in which people live.

SenseCam [30] is a wearable digital camera, especially meant for people with physical and mental health problems, that tracks and stores an electronic record of users' life. When users play back the stream of images recorded by SenseCam, images act as a powerful autobiographical memory cue.

SMOKS [31] is an electronically enhanced garment meant as an experimental platform to record memories. It adopts electronically enhanced suits that allow to construct individual and collective memories, to create and nurture social networks, and to support personal communication and intimacy.

iFlashback [32] is a set of cameras, sensors, displays and RFID tags, able to extend human memory by recording activities of user's life.

The forget-me-not [34] device is a tool to store and manage records of several types of behaviours, such as meeting people, using the PC and making telephone calls. The stored activities are shown back to users by means of a portable device.

The remembrance agent [34] is a text-based augmented-reality system. It makes use of a wearable device, represented by a pair of glasses or by clothes, to record audio and video, to perform face recognition, to detect location and bodily responses of its users.

MyLifeBits [35] is a software for collecting all personal documents and media online and showing them as a stream of information about one's own life.

Finally, Remembering today tomorrow [36] is a research project about the use of critical design to encourage the development of digital mementos which are meant to support users in reflecting and meditating about their personal experiences. The authors propose three different methods useful for designing smart objects which support personal reflection.

Following Harper studies [26], we suggest to adopt memory as "resource for action" and not as "something in the head". Exploiting the power of memories people find a way to understand their actions, to evaluate their past experiences in a different way and to make choices for the future. According to this vision, past is not something which is already finished, but it is still something else, able to give a different shape to the present and future [27].

Exploiting the relation between memory, place and personal identity people become able to tell their personal stories, not just as something that they have experienced, but as something which is able to describe themselves. Using devices to track their memories, people adopt the role of story makers. In such a scenario, we aim to analyze people's reactions when some external components destroy or corrupt their personal stories, changing their details and information.

3. Background information

3.1. Problem: Urban Spaces and Personal Identity

A long tradition of studies shows how human beings establish a deep relation with the physical environment [1][2] in which they live and how, in turn, their environment influences the creation of their own identities.

Nowadays, however, this relation is hindered by the overabundance of information and events that characterizes any environment, due to the pervasiveness in urban spaces [2] of information in general and information technologies such as public screens and mobile devices.

As a consequence, the distinction between virtual and real spaces [3] becomes unclear and indeterminate. People experience a sort of dissociation from space [4], and the loss of a real and authentic experience of themselves in their contact with urban space.

Bringing these considerations at a deeper level, Augé [6][7] theorises a “collision” between “non-place” and “place”. Non-places represent places in which people are only passers-by, such as airports or train stations, places that people leave immediately after that they have achieved some specific goal. Conversely, a “place” is where people are active subjects of an event, and what is happening in a place becomes a reason to undergo remarkable changes in the identities of people who live there.

At present, however, places are characterised by information overload: people experience problems in isolating interesting information, they usually feel disoriented and can't distinguish their personal information from more general one. Thus, information overload makes the context of acting ambiguous and confused. We intend to exploit this situation of confusion of information, stressing on this gap for pushing people to reflect and rethink their relation with the surrounding space.

Our interest for body comes from the suggestions derived from several disciplines concerned with the relationship of the body in space.

Starting from a philosophical point of view, we can cite phenomenological studies about the understanding of embodiment in terms of human beings' participation in the physical world [49]. Also, architecture addresses the idea to develop spaces in which people can feel certain sensations and can exploit them for reaching specific purposes [51]. In addition, also art can generate responsive art installations to discover the importance to exchange feelings, emotions and so on with surrounding spaces [52][54].

Taking inspiration from these insights, we focus on the qualities of interacting with spaces to exploit the potentialities offered by bodily experiences in the space.

We are convinced that the existence of an open space,

characterised by confusion and disorder, could be the point to start a new observation of and a new relation with urban space. To overcome the previously discussed dissociation between people and their environment, and following the insights derived from Featherstone [8], we propose to choose body as a new way to connect people and their environment [5]. Accordingly, we choose wearable technologies to improve the users' experience in urban spaces in a more natural and easy way.

3.2. Bodily experience as a way of reconnecting people to their environment

Wearable technologies allow an interaction between people and places that requires minimal effort on the part of users. People, in fact, only need to use their own body to get in contact with the environment thanks to a number of sensors and actuators that can seamlessly trigger events such as, in the case of our experiment, the recording of an image, a sound, or, more in general, a situation that people are experiencing [9].

Wearable technologies provide a reliable contact with the environment because they support a continuous interaction between the computer and its users, offering users the capability to perform multitasking activities without overwhelming them. Thanks to wearable technologies, human body has become an innovative interface through which people can receive information from a large variety of personal devices. The body operates as a “framer of information” [8] because only through the body users can receive and send messages, manage and store information, track some parameters, and decide what they want and what they do not want to know about the context around them. The body controls all kinds of information.

Thus, the role of the body in the space is doubled: on the one hand, it represents the way to interpret reality; on the other hand, it activates the display of information about itself. Finally, the body becomes a bridge across which the ambiguity of boundaries between “real” and “virtual” can be overcome. The “digitally empowered” human body allows users to control information overload, making it possible for them to navigate, consume and grasp the spirit of a place and thus build one's own identity.

The idea to encourage “bodily interaction” first emerged in the use of mobile technology and proceeds until wearable computing. In particular, Fortunati [10] shows that mobile technology is able to reduce the sense of absence and distance between people. According to Fortunati, mobile phones allow a “present absence”, connecting people through an intermittent mobile communication. This kind of communication, called hyper-coordination [11], changes the contours of everyday life, making previously uncertain time-space coordinates certain and determinate. In this sense, non-places are transformed in space by mobile phones and, according to Sheller [12], the human body becomes both

an entity in urban space, and a node of a micro-network society where time and space have fluid, floating and indeterminate coordinates [13]. Wearable devices go beyond mobile phones, giving more importance to the body as a new, unique way to interact with the environment. Passing the boundaries between “human” and “machine”, wearable computers blur the distinction between an “inside space” and an “outside space” which was still in force with mobile technologies.

Hansen [14] defines a new physical area, called “wearable space”, in which space becomes wearable when the presence of the body is functional to allow the existence of a mediated space to be experienced sensorily, precisely a space which is made wearable through bodily experience. In particular, Hansen explains that “wearable space” derives from the combination of two poles: a space shifts in something wearable “when affect becomes the operator of spacing or the production of space through bodily experience”.

Initially, “wearable space” represented an interactive space between wearable and spatially embedded interfaces, but now it is open up to different types of media, such as mobile ones [15]. The goal of wearable space is not only to create a bridge between users and architectural environments, but also to generate a link between users and other users, users and social networks, users and computers, users and spaces.

We stress Hansen’s definition to encourage users of wearable technologies to identify themselves in the environment, allowing common places to play a significant role in the process of construction of users’ personal identity.

3.3. Critical design as a research tool

We chose a new design methodology to improve and provoke the engagement between people and environment. Critical Design approach is receiving much attention in the Human Computer Interaction and Design research and its adoption is controversial. Many ongoing discussions [53] are about how to define a critical design theory suitable for HCI research and practice. Anthony Dunne and Fiona Raby proposed the critical design approach as a methodology of research aimed at stimulating reflection and critical attention on the part of consumers about both their everyday lives and how the design of objects, their shape and their representations influence assumptions, values, ideologies, and behavioural norms of their life [16][17]. Dunne defines critical design as “a form of social research”. This statement remarks that its main output is not a new innovative product, but the knowledge and the stream of insights that derive from it [17]. Critical design, in fact, uses design tools as a means to stimulate a “critical sensibility” in users [18]. Although the early attention is to designing [19], the main goal consists in supporting the development of critical attitudes in users, so that they can exploit these insights to build critical and innovative

thoughts about future products and designs.

Bringing the critical design approach one step ahead, we introduce the concept of ambiguity in our methodology. Through ambiguity, we want to encourage people to analyse urban spaces and to use their insights to collect themselves and establish a deeper relationship with their environment, rethinking them. “Usefulness and usability are twin goals of HCI research and development”[20]. Designers usually aim at achieving these goals, avoiding all kind of ambiguity and dis-usability of the final product. In some cases, however, ambiguity could represent a source of innovation and creativity to support the development of a good design and keep the attention on users’ needs. We choose to refer to ambiguity of information and ambiguity of context [21], which are both characterized by a lack of information: more data are needed to understand an event or a situation. We also refer to the “ambiguity of relation”, which can originate from a person’s point of view about a certain situation or event. In order to conceptualize a known event in a new way, people should change their point of view. A new point of view, in fact, causes users to experience a cognitive dissonance[41], in which they perceive a contrast between what they know and think and what they hear and see [42].

Reality appears in an ambivalent way, so that people are pushed to look for something beyond the real environment. The perceived inconsistency between knowledge, feelings and behaviour, in fact, establishes an inner state of discomfort, cognitive dissonance.

The dissonance is perceived as psychologically uncomfortable, thereby people that received it are stimulated to reduce or delete it by changing something. How people decide to react to this uncomfortable situation can have an effect on their behaviours and on their beliefs. On the one hand, some people might modify their behaviours, for example, they might stop going in the city centre for shopping and choose another place in the city; on the other hand, some people might change their knowledge, e.g. they might reduce their beliefs on parks as relaxing areas. Finally, other people might try to minimize the importance of dissonance avoiding the situations that can cause confusion and misunderstandings [43].

We will propose to analyse how people react to distorted and misrepresented signals about the space in which they live. Furthermore, we want to highlight how these signals cover an important role in the mechanisms of construction of personal identity and in the way people recognize themselves in their everyday context.

For our goal, we selected Matassa et al. [39][40] prototype as the best fitted to our project.

3.4. Prototype description

We choose to exploit the functionalities offered by Matassa et al. [39][40] prototype, a wearable interactive system that combines wearable technologies, mobile

phones and PCs. The technologies applied to develop the prototype were the LilyPad Arduino and its components.

The final prototype is composed by two different devices:

- First, a wearable personal device allows users to register their own memories with a simple gesture of their hand. It is a special glove, composed by a LilyPad Button Board and linked to LilyPad main board using E-textile technologies, in order to activate an app installed on mobile phones.
- Second, a device located on the bicycle allows to obtain information about a previously registered memory. It works giving back to the user some feedback, for example lighting signals, to declare the presence of a memory registered in the past.

4. THE STUDY

Citizens can have different types of urban memories: they have memories as single individuals that live in the city; memories with their friends and family; memories about past situations and lifestyles and, finally, memories about feelings and emotions which relate to urban space and urban time.

We focus our research on citizens that daily use a bicycle to move within their city and that are between 20 and 50 years old. They can be considered active collectors [23] of urban memories because they are early adopters of innovative technology and oriented to collect memories in urban spaces using various types of social applications such as Instagram, Flickr, and so on.

The study follows the method of critical design and takes place outdoors, in the urban space. It consists in an observation [46], in which we try to evaluate the use of a new technology, namely, the wearable device described in Matassa et al.[39][40], to observe how users use and integrate it in their everyday life, what they do and how their behaviour changes in a certain period of time.

The study will consist in three stages:

- **An observation in the wild** of how participants use the interactive system to collect their memories [29] while cycling. In this phase, participants are not given any specific instruction, nor are they imposed any constraints. We intend to conduct the observation in their everyday travels around urban spaces to discover what kind of feelings, emotions and memories a space evokes in the users and why people may want to keep a trace of space in their day-to-day life. We will use the technique of shadowing [47] to follow subjects as they go about their routines, focusing our attention on the elements that they record, and on what they do and say during their interaction with the device.

- **An interview** about the memories participants will have mapped. We propose to ask to users to speak about some specific moments and situations met during the use of the device. We are particularly interested in gaining an insight about the action of recording memories, about the feelings elicited by the receiving of messages and about their use of the device to interact with urban space. We aim at understanding the relations between the private and the public nature of urban spaces and the degree of intimacy of the memories.
- A second phase of **observation in the wild**, similar to the first phase, where we will observe participants during a tour in urban spaces, where they receive dissonant memories. Such memories represent affordances to recollect previously stored memories, but they will be purposefully altered to provoke some reaction on the part of participants. As a result, we expect to be able to compare the memories consciously stored by users (chosen as components of their identity and helping people to recognize who they are) with the dissonant, altered memories which are sent to users for stimulating a reaction to ambiguous information, contrasting with personal reminiscence.

Also, technology provides users with information and situations that make their relationship with space stronger. In fact, technology can show users what they have done and give them a representation of themselves [44] in various situations in urban space, encouraging their reflection and awareness about it.

In the following section, we introduce two different scenarios to better understand a) the current scenario of interaction with wearable devices for tracking memories in a city, as it was proposed in Matassa et al [39]; b) a future scenario in which people interact with ambiguous landscapes, where they don't recognize themselves and their previously stored memories. Through the second scenario, we show how we would encourage people to imagine how they could change their individual perceptions in relation to space and how they could act to minimize or remove cognitive dissonance.

4.1 SCENARIOS

4.1.1 A simple day in urban space

It's Monday, Luis takes his bike to go to his workplace and he crosses the city center. He is very relaxed when he rides on his bike because he likes to look around, reflect and plan his day. The environment around Luis represents the landscape of his past, present and future experience, but Luis sometimes is quite disappointed because he does not remember very well all the events and the situations that he lived in his city. Part of his previous experience and memories are inevitably lost, so Luis decides to adopt

an innovative interactive system, made of a device positioned on his bike and of a wearable device that allows him to get in touch with urban spaces. Usually, when Luis arrives in a place where he recorded a previous experience, the device activates a notification light for making him aware that he stored an important memory connected to that place.

The wearable device communicates with a mobile app that allows to visualize and enrich stored memories, adding pictures, information about thoughts associated to that memory, or about the mood he was in and the friends that were with him. Luis can notify his friends about his memory through his mobile device and share it.

Luis re-thinks about that place, how it changed over the years and how it is meaningful for him, and through these thoughts, he becomes aware about the role of space in his life.

4.1.2 Dissonant memories in a simple day

Day-to-day, Luis travels around the city center to arrive to his workplace. He uses the wearable device to re-discover his memories and store them again, but this morning, near the city center, he receives a strange message. The memory pushed by the device is about a wasteland, in which people seem to turn far. The urban space is in contrast with the retrieved memory, because Luis sees that the landscape around him is very nice and enjoyable.

He is trying to find again where and when he created such a memory, when he feels whipped and annoyed by the landscape. He thinks he might well have lost this memory, but he is sure that there is something strange in today's message.

When Luis arrives to his workplace, in his mind there is the desire to re-build the correct memory and perception about the urban space and the received memory.

5. OUR EXPERIMENT AND EXPECTED RESULTS

We propose to choose three different urban landscapes: city center, suburbs and a pleasure place such as a shopping area, a park and so on. We intend to select some of these areas and to associate them with some messages that we will use as memories to deliver to users when they will go there.

The messages will be in contrast with the common perceptions of these areas, for example in suburbs users will receive a message about the care and the pleasure of the landscape. The message will be sent in the same area where users previously stored a thought about the state of neglect and disorder of the area.

The change of perspective and the receiving of dissonant messages are used to stimulate a deeper reaction on the part of users and with respect to urban areas. We propose this experiment to prove how ambiguity in design can be a resource for users. Following Gaver [22], we think that

ambiguity of information and perception can have positive effects on the users: "ambiguity can be frustrating, to be sure. But it can also be intriguing, mysterious, and delightful. By pushing people to interpret situations for themselves, it encourages them to start grappling conceptually with systems and their contexts, and thus to establish deeper and more personal relations with the meanings offered by those systems" [24]. We intend to underline that introducing some components of variation in the content of users' memories, we encourage users to reinforce their relation between space and personal identity.

Our main goal is finding how an interactive system that stimulates people's reaction with incorrect components could be a tool to move people reflection, awareness and care of spaces. For this goal, we intend to measure the results obtained from this experiment as follows.

On the one hand, we have a strong hypothesis that drives the investigations to understand the correlations between human beings and urban spaces. We are supported by a large background about the existence of a strong bond between people and urban space in terms of feelings, memories and abilities to recognize themselves.

On the other hand, we intend to track how incorrect memories pushed to users can drive the users themselves to correct memories and feelings about a specific memory. We focus on data inserted by users to reply to dissonant memories. We propose to analyze the type of corrections introduced by users, what kind of activity they do on memories, what encourages them to participate and interact with previous memories and change them. We intend to discover hidden relations between space and identity, using the stored memories in provocative ways and sending them to users in a random stream in contrast with the space where they were tracked.

The results we will expect from this experiment are multiple.

On the one hand, we imagine that users will reply rapidly and strongly to these strange messages remarking their disagreement to them. Maybe they could correct the memories with their present sensations and perceptions. We think that some people might refuse the adoption of the wearable device, feeling whipped and not embodied by the received memories.

On the other hand, we hope that users can discover new unexpected bonds with urban spaces and with their personal memories thanks to critical design. We hope to stimulate an innovative key to interpret users' relationships with their memory and their memories in the city, and to encourage the emergence of the value that urban space has to support reflection.

We aim at stimulating the review or revisiting of memories about past events and situations in order to challenge initial thoughts and assumptions and to require the rethinking about themselves and the integration of new and old experiences in a new conceptualization of themselves.

According to psychological studies [28][54], we are convinced that what makes people the way they are, as

well as the way they perceive and feel the surrounding environment, seems to be strictly connected to the way they acted in the past in a specific place. In this sense, each place is characterised by projectable features, which are retrievable by observing the environment and combining them with previous knowledge based on memory, and by non-projectable features, which derive from memories of past interactions with a space and make it a place of experience and not only a general space.

How people perceive a place becomes a mash between what they know about it and what they have previously experienced there, i.e., more in general, their memories about a place.

Corrupting their memories, we are sure to interrupt a natural and spontaneous mental flow and to stimulate people's reflection about the real values that places have for them.

6. CONCLUSIONS

In several works researchers underlined the importance of existing bonds between people and space to encourage and support the building of human identity. This relation is intensive and influences the care and the attention that people give to their city. The goal of this paper is to determine the main elements to use to conduct an experiment of critical design for moving people in reflection and rethinking about their perceptions of urban space and, in a deeper way, of their identity, as it is strictly connected with the space in which they live. Through the delivery of ambiguous information, we aim at stimulating people to re-find their personal thoughts and sensations about a space, a situation or an event of the past. We will encourage people to go beyond the digital information to pay attention to the context in which they are living.

7. FUTURE WORKS

The steps for the future realization of the proposed experiment are:

- 1) Choosing a technological device to give to users for supporting the storage of memories in the urban space. In particular, we are thinking about the adoption of the previously described device because it is:
 - *unobtrusive*, a feature linked to the need that the device collects data without any interference in user's everyday life;
 - *useful in social situations* without causing any discomfort;
 - able to *encourage reflection* and focus on it. To encourage reflective behaviors we intend to focus on the way in which information is shown.
- 2) Selecting a certain number of dissonant messages to

send to users in order to disturb their urban interactions;

- 3) Monitoring users' reactions to the reception of messages. This step is made up of the observation of users' behavior and the analysis of users' answers to the incorrect messages they received.
- 4) Adaptation of the device to improve the connections between city and citizens and encourage their civic engagement to take care of urban spaces.

These stages reproduce the same stages that people follow when they recognize a conflict between their current state and an ideal one. We intend to use the Transtheoretical Model [45], a model useful to describe the paths that people follow to modify and change their problematic behaviors, to recognize the phases that happen when individuals realize that there are inconsistent meanings in their behaviors and attitudes related to urban space. The Transtheoretical Model helps us to recognize them and to define behavioral patterns that people adopt to address inconsistent meanings and memories in urban spaces on which their identity and personal memories are built.

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