

Proxemics in Public Space: Media Technology Projects

Mika Igarashi, Michiel Stade and Sylvain Vriens

Leiden Institute for Advanced Computer Science,
Leiden University, the Netherlands

Abstract

This paper presents an overview of the treatment of the concept of private and public spaces in design and media technology projects with a particular attention to proxemics. i.e. the social behavioural spacing between individuals.

Keywords

Public space, private space, privacy, personal space, territorial behaviour, social behaviour, media technology, design, interpersonal relationship

Introduction

We define Public Space as consisting out of many private spaces. How does our private spaces dynamically change in public space? How does one protect one's own private space or invade other's private spaces, as embedded in our social behavior in public space? Need for physical privacy and private space is inherent to all human beings. This need is rooted deeply in our daily social behaviour. Science has considered the need in the design of spaces and technological projects have investigated the concepts in various fields.

The paper firstly investigates the philosophical and psychological notions of privacy. Secondly, it discusses the functionality of privacy particularly relevant to social behaviour in public spaces, namely, personal space and territorial behaviour. Thirdly, it introduces how these concepts have been incorporated into the design of public spaces. Fourthly, it surveys how this idea has been explored in the field of media technology. Finally, it details the background concept of Have-A-Seat media technology project.

1. Privacy

Privacy is an interpersonal boundary-control mechanism that regulates interaction. It is an optimizing process that seeks the desired degree of interpersonal distance sought at the particular moment in time. This is done by balancing between 1) desired privacy: how much contact is desired at the moment in time with the specific other, and 2) achieved privacy: the actual degree of privacy obtained at the time. Thus, privacy has both attracting and distancing forces. The state of imbalance between these two results in an intrusion of privacy or isolation. Optimal degree of privacy constantly shifts depending on the flow of input from and output to others. Privacy is based on various social units: individuals, families, social

groups etc. Privacy goals are obtained through a behavioural mechanism that consists out of¹:

- 1) verbal and para-verbal behaviour: content and style of verbal interaction
- 2) personal space: area surrounding individuals and groups defined by angles and distances to others
- 3) territory: use and ownership of areas and objects
- 4) cultural mechanisms: norms of behaviour regulating the contacts of the members with others

Above behaviours operate as a unified system that mutually amplify, substitute and complement.

Julius Fast describes an incident that vividly illustrates the privacy mechanism and reaction to a threat to one's territory and personal space of an individual. Fast and his friend were at a table having lunch, seated opposite to each other at a table for two. His friend took several steps in encroaching Fast's territory and personal space in this setting, from which Fast felt a strange uneasiness but could not tell what it exactly was. His friend first laid a cigarette packet just in front of Fast while continuing to talk. Fast found himself uncomfortable, but was unable to define the feeling. Then, his friend pushed his plate toward Fast, which increased the uneasiness. When the friend leant towards Fast over the table, Fast could not help interrupting the conversation out of anxiety. His friend then explained how he had demonstrated a basic fact of body language: They have divided the table into two on the basis of established convention; one half for Fast and the other for the friend. This imagined territory should be respected and the other's half should not be intruded. By putting cigarette packet deliberately into the Fast's half, the friend broke the agreement. As the friend pushed his plate and leaned towards Fast, having his personal territory encroached caused Fast uneasiness.²

In a public setting, personal space can be observed when people are standing in line: they do not stand directly next to one another, but with some distance between each other. When they stand too close to each other, it engenders uneasiness. The exact distance varies depending on several factors such as cultural norms.

Studies of the specific space requirements of people and the optimal distance in certain particular communicative circumstances have become a new science, called Proxemics. Purpose of proxemics is to maintain social order by regulating human interaction.

2. Interpersonal spacing in public space

For social behaviour in public spaces, which is a spontaneous interaction that takes place between strangers, the personal space and territorial behaviour are particularly relevant, cultural norms playing a major role in setting parameters of the two. The size of personal space and characteristics of territories are determined by various factors.

2.1. Personal Space³

Personal space was first researched by Hediger who discovered that animals maintain a remarkably constant distance between one another.⁴ Personal space is a dynamic, active process of moving toward and away from others, to make oneself more or less accessible to others. Hall observed interplay of personal distance: spacing that animals keep from each other, and social distance: a psychological distance beyond which animals feel uncomfortable due to need to be in contact with others. Hence, personal space behaviour involves withdrawal and protective reactions to intrusion or overly close contact by strangers, and a desire to be close to liked others: attracting and retracting forces. Personal space is defined as: "an area with an invisible boundary surrounding the person's body into which intruders may not come."⁵

Factors in Personal Space

Personal space is influenced by multiple factors: interpersonal relationship, personality, cultural norms, age, gender, and situational elements among others.

1) Interpersonal Relationship

Hall has described the most important facts about the personal space between people.⁶ He differentiates between four distance zones: *intimate*, *personal*, *social* and *public speaking distances* depending on the interpersonal relationship between the subject and the other.

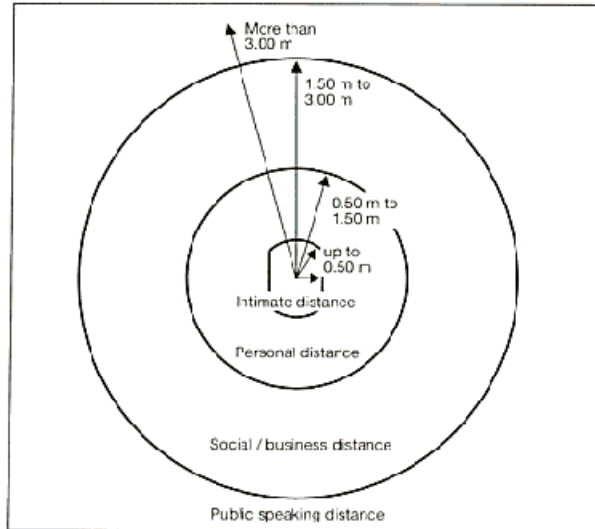


Figure 1: Proximetry zones for those who do not know each other well

2) Personality

The distances between different interpersonal relationships and personalities are described by Ruhleder.⁷ Anxiety is an important factor that plays a role in the spacing of personal space. Individuals with high anxiety level, typically introverted, take a greater distance between themselves and others. It has been indicated that personality disorder influences personal spacing; abnormal personalities resulting in abnormal personal spacing.

	More introverted person	More extroverted person	Stranger
Intimate distance	0,40 m - 1,50 m	0,30 m - 0,50 m	up to 0,50 m
Personal distance	1,50 m - 2,00 m	0,40 m - 1,50 m	0,50 m - 1,50 m
Social/business distance	2,00 m - 4,00 m	1,50 m - 3,00 m	1,50 m - 3,00 m
Public speaking distance	from 4,00 m	from 3,00 m	from 3,00 m

Figure 2: Distances in the 4 proximetry zones

3) Cultural norms

The size of desired personal space is cultural dependent. It is generally agreed that North Americans needs wider personal space than North Europeans, North Europeans need more than South Europeans, and South Europeans need more than Arabic population.

4) Age

Regulation of personal space is learned and developed only through social interaction, along with other social skills and norms. Therefore, young children are unable to take regular distance, at times being too close or further away from others.

5) Gender

It is anecdotally believed that gender influences the size of personal space. For example, females tend to take less personal space from each other than men. However, the findings of researches are not sufficiently consistent.

6) Situational factors

It has been observed that the size of personal space varies depending on the action the involved individuals are taking and the environment (input and output dependent). For instance, the desired personal space is wider when two individuals are engaging in a conversation than when they are simply seated next to each other. Also, in case of common danger or emergency, the size of personal space shrinks dramatically.⁸

7) Number of individuals involved in the interaction

The number of individuals increases the desired personal space. For instance, when a doctor and a patient are engaged in a conversation, optimal conversation distance is between 90 and 150 cm, falling into personal distance. When the discussion involves several people, business distance of 2 and 3 meters is more optimal.

2.2. Territory

The concept of territory originated in the sociological studies of urban life, beginning in the 1920s.⁹ The notion of territory is present in our daily life both in language (e.g. my place, my turf, keep out) and in behaviour, as described earlier in Fast's experience. When a territory is encroached, it gives rise to uneasiness, threat and aggression. Transgression through a territory is permitted only when it does not signify invasion, and when it is done in an obviously submissive manner. In human society, territorial ownership extends to various entities including streets, houses, objects, ideas and other individuals. The process of the personalization of these entities involves management of mentally drawn boundaries. Territory in public space where land ownership does not involve predetermined superior or inferior relationship (except in case of being in a larger group territory, e.g. white man walking on the street of a black neighbourhood). The first passenger of a public bus does not claim a larger territorial space than the second passenger, but the space tends to be divided equally between individuals. This equal division of territory is also described in the example of Fast.

Categorization of Territory

Territorialization can be influenced by: 1) kind of motives, purpose and action taken, e.g. sitting or sleeping, 2) geographical characteristics, e.g. location and size, 3) temporal duration of territorial possession, 4) behaviours that mark territories and action taken against encroachment.

There are three kinds of territories particularly varying in the degree of permanency of ownership and degree of control occupants have over the use of a place: *primary*, *secondary* and *public territories*.

1) Primary territory

Primary territories are owned on a relatively permanent basis and used exclusively by certain individuals or groups, being marked clearly as their possession, e.g. home.¹⁰

2) Secondary territory

There are two types of secondary territories, called *home* and *interactional*.¹¹ *Home* type refers to spaces that the regular user claims an ownership, e.g. specific seating in a local bar for a regular customer. *Interactional* type can be classified also as a *group personal space*, regulating the use of area by community members, for example, streets in an Italian neighbourhood used primarily and regularly by Italian residents.

3) Public territory

Public territories have a temporary quality, free access and occupancy rights to almost anyone. There are two types of public territories:

a) *Occupancy by society*, e.g. streets and parks where individuals have no restriction in access yet are expected to respect social rules.

b) *Free occupancy* e.g. isolated beach that is open to almost any use for a limited amount of time.

Lyman and Scott speak of public territory as allowing freedom of access but not necessarily of action. It is open to all, yet certain expectations of appropriate behaviour limits the freedom, often restricted by local social norms and regulation. For example, individuals are allowed to seat freely on benches in public parks, however, are not generally allowed to sleep there overnight. The characteristic of public territory is that it does not usually involve ownership or possession, and is controlled only by the right of access for a brief period of time and for a particular purpose.

Goffman describes a variety of public territories:¹²

- i) *Stall*: a public space for which a temporary ownership can be claimed, that disappears when they leave the place for more than a short amount of time, e.g. tables in restaurants, tennis courts.
- ii) *Turn*: a place in line e.g. at ticket counter. Turn is a claim to an order of use of a resource, is open to anyone, has temporary nature and must follow certain rules.
- iii) *Use space*: an area around an individual or a group that is recognized as being in use, e.g. line of vision in an art gallery.
- iv) *Possessional territories*: objects identified as belonging to an individual, e.g. clothing and eating utensils.

Public territories are generally more fragile than primary and secondary territories, being heavily dependent on institutional norms and cultural customs rather than preferences of individual users. The territorial behaviour that takes place in public space is regulated mostly by public territorial rules.

3. Proxemics in public space design

The function of proxemics is to maintain social order. Lack of consideration of proxemics in environmental design leads to discomfort, conflict and even to a high crime rate in extreme cases. Environmental designers have been intuitively sensitive to personal space mechanisms in furniture design, layouts of office and living-room areas among others. For instance, office desks and chairs usually place people about 4 feet from one another, within Hall's social distance zone, deemed to be an appropriate distance for strangers in a public environment. Another example is at doctors' offices, where the doctor and patients converse in the distance of 90 and 150 cm, a personal distance between strangers.

Primary territories such as a home are marked clearly as owned by means of placing name tags or building fences around it. However, secondary and public territorialization is more problematic than primary territory, lacking in clear indication of territory ownership. In his investigation of high crime rate neighbourhoods, Newman observed that one of the key problems was the design of the semi-public areas, e.g. hallways, entranceways to the buildings and immediate street areas.¹³ In these neighbourhoods, these places were not easily personalized or territorialized, thus not placed under the surveillance or control of the residents. These places became non-defensible territories and thus vulnerable to crime. Car vandalism study indicates similar findings; vandalism occurs more frequently near unterritorialized areas, e.g. abandoned houses, vacant lots or railroads.¹⁴ Lack of surveillance, territorial control and evidence of territorial ownership in the design of public space influences the social behaviour of the users. Solution to such problem would be to convert such public areas into clear secondary territories by architectural design techniques using symbolic territorial markers.

Public space design plays a crucial role in defending the proxemics order. It indicates the size of personal space and public territory allowed per person, creating a general rule for the use of the public space based on human proxemics needs. Phone booths in public space tend to have walls or take a form of closed boxes in order to keep the personal space and protect the territory over the conversed content.

The figures below show how public territories for individuals are indicated on public seating facilities by the spacing between seats and installation of arm rests that separates seats in station benches, and by the use of consecutive seats consisting out

of many single chairs of an individual size in trains and movie theatres, instead of one long bench.



Figure 3: Spacing between seats indicates the personal distance



Figure 4: Arm rest dividing one bench into two territories



Figure 5: Movie theatre seating consisting out of multiple single chairs

Due to the fragility of public territory and its dependency on social and cultural norms, the protection of public territory is strongly influenced by the space design more than primary and secondary territories. Some phone booths have little sound shielding, some walkways get too crowded, and some tables in restaurants are too closely located. In these cases, the users can do very little to avoid invasion of personal space and territory than to utilise other social behaviour such as verbal and para-verbal signs, e.g. apologize for being too close, or to intentionally look away. Thus, the awareness of human proxemics needs in the design process of public space is particularly important.

4. Treatment of Proxemics in media technology

The need for privacy has been widely addressed in political and legal realms. In relation to media technology, privacy concerns are heightened in the design of communication protocols and networking systems in terms of personal information.¹⁵ Thus, the interrelation between technology and privacy has been largely in information management. Architecture and interior design has considered the basic human needs for privacy and personal space,¹⁶ however has not incorporated the media technology in the reasoning and solution. There are some theoretical consideration of privacy and personal space in webspace and interface design, as seen in researches in digital collaborative workspace design¹⁷ and digital environmental design.¹⁸ There are a number of projects that deal with the attracting force of the privacy mechanism,

i.e. bringing distant people together. However, there seem to be much less projects treating the distancing, retracting forces of interpersonal relationship. In particular, technological undertakings that assert the need for physical interpersonal space appear to be scarce.

Below presents an overview of existing media technology projects investigating the issue of interpersonal distance with a particular attention to the notion of space. The projects can be largely grouped into two categories: *Human Connectedness*: bringing individuals closer, and *Human Disconnectedness*: giving more distance between individuals or individuals and machines.

4.1. Human Connectedness

Human connectedness projects that primarily deals with space can be categorized into two: *Connecting spaces* and *Exchanging territories*.

1) Connecting Spaces

*Passage*¹⁹

Passage concerns the notion of personal space, and brings strangers that are usually at a social distance or further to an intimate distance. It is a media space that interfaces individuals in different cities. The interface is designed so that the strangers at separate locations interact with each other very closely, almost touching each others' silhouettes on the interaction surface. This poses an extremely close proximity with a complete stranger, engendering surprise, intimacy and possibly uneasiness. Proxemics holds that the optimal distance between strangers to be three meters or more, 1.5 meters even in conversational situation. In *Passage*, complete strangers are invited to communicate very closely to each other, almost touching one another. This breaks the law of proxemics, arousing unusual sense of closeness and discomfort. However, the actual stranger is not in the user's intimate space, but in another city. This creates an ambivalence of connectedness and disconnectedness that is unique to this project, not possible to experience in everyday life.

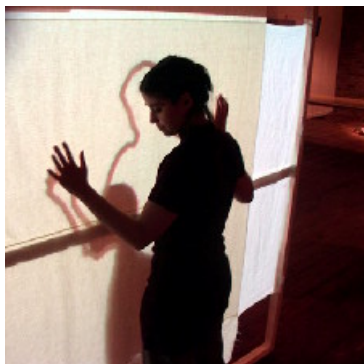


Figure 6: *Passage*

*iCom*²⁰

iCom connects personal spaces and blurs the boundary of territories by seamlessly linking spaces. It is a multipoint, surrounding interface that connects two distant locations in a non-breaking manner. By constantly connecting separate spaces, it creates a sense of social connectedness among the users. This project deals with extension of the participants' personal spaces to one another. By embedding the connection point to the surrounding in a immersive manner, the participants share different levels of personal spaces with each other, creating a feeling of connectedness – pleasant or unpleasant, depending on the terms of relationship among the users and the closeness of the point of camera interface.



Figure 7: *iCom*

2) Exchanging territories

There are projects that connect individuals by exchanging psychological territories, e.g. *Trading Places*, and physical territories, such as *Peek-A-Drawer* and *Habitat*.

*Trading Places*²¹

Trading Places deals with psychological territory: personal memories and ideas as considered to be possessed by individuals, which can be extremely private. This project enables people to exchange their memories, feelings and experience of places. *Trading Places* is a website acting as a travel agent, where users are encouraged to report their experiences of another city in Amsterdam. For example, on a rainy day, if you go to this MacDonald's on this street and sit on this seat near the window and look out to the street, it feels like you are in Boston. Other users can request to go on a virtual trip to Boston, and goes to the specified MacDonald's provided that it is raining at that moment. This sense of another space is based on the resistor's experience, lived by another user that acts as a traveller. They share a space in their memory, or the experience of the space. This experience of space is an emotional and conceptual territory of the resistor, shared and experienced by the traveller. In this manner, it can be said that this project enables *psychological (metaphysical) territories* to be shared between individuals.

Peek-A-Drawer

Peek-A-Drawer enables two individuals to share and exchange their primary and possessional territories. It gives a sense of connected and communication by exchanging the spaces in two drawers of different locations, and virtually sharing each other's belongings. An individual can keep his personal belongings in a drawer space, of which image is communicated to the drawer of another person and vice versa, thus exchnaging private information about each other. The drawer as a private space is a territory of the owner (spatial territory), as well as the objects kept inside the drawer (object possessional territory). By exchanging and sharing each others' territory, the users of Peek-A-Drawer establishes an intimate connection between one another..²²



Figure 8: Peek-A-Drawer

*Habitat*²³

Habitat shows another example of two individuals sharing and exchanging their primary territories at home: in this case, their dining tables. Habitat is a piece of furniture that connects geographically distant people by connecting their private spaces, such as a table in their living-rooms. Through this, separated individuals can share their daily routines and cycles.



Figure 9: Habitat

4.2. Human Disconnectedness

Projects concerning human disconnectedness can be largely grouped into three:

- 1) *Disconnecting humans*
- 2) *Using the notion of personal space in project development*
- 3) *Project on the theme of personal space*

Below, each group are introduced and discussed with project examples.

1) Disconnecting humans

Projects with the theme of interpersonal disconnection address the fear of being touched, scrutinized and privacy invasion. *No contact Jacket* focuses on *physical disconnection*, while *Please Wait* concerns the *informational disconnection*: personal information and cognitive attention.

*Please Wait*²⁴

This project considers the inside of a person's head, or perception, to be a psychological territory that needs to be protected. The head-worn device disconnects the external world and the user by preventing all unwanted access. The user cannot see or hear anything unless the others swipe their ID card in the ID scan machine and have been approved to talk to the user. *Please Wait* was developed to protect individuals from unwanted distractions that takes place in capitalized society; questionnaire about commercial product, filling out forms for customer profiling, sales person contacting you to sell items. These activities can be seen as privacy invasion and unwanted communication that almost inevitably takes place in everyday life. Through the regulation of the communication between the individual and the external world, *Please Wait* acts as a privacy protection mechanism, which proxemics is part of. The important characteristic of *Please Wait* is that it assumes and provides a strong informational human disconnection as a basis of such communication control.



Figure 10: Please Wait

*No Contact Jacket*²⁵

No Contact Jacket protects a person's physical territory, i.e. his own body. Thus, this project does not concern the idea of personal space; nonetheless, it strongly addresses the necessity of human disconnectedness. When activated, the jacket electrically stuns those who touch it. It expresses the fear for unwanted contact and being attacked. This project expresses the securing of physical privacy based on bodily human disconnection.



Figure 11: No Contact Jacket

2) Using the notion of personal space in project development

There are some projects that consider the need for personal space, although they do not deal with the idea as being central to their project concept. These projects tend to utilize the notion of personal space in interface design.

*Head-Tracking for Gestural and Continuous Control of Parameterized Audio Effects*²⁶

This is a synthesizer that employs the concept of social gestural cues and personal space in the design of the man-machine interface of a guitar synchronizer. As one of its several social features, the system coordinates the distance between the performer and the camera in order to prevent personal space intrusions and to ensure the user comfort. This project attempts to improve man-machine interface by incorporating social rules into machine's behaviour, respecting the personal space of the user being part of it. This is an interesting undertaking when considered in relation to the concept of Man-Machine relationship that will be mentioned later in this paper.



Figure 12: Head-Tracking for Gestural and Continuous Control of Parameterized Audio Effects

*Public Anemone*²⁷

Public Anemone is an interactive entertainment robot that keeps a personal space between itself and the audience to properly capture their movement. By doing this, it ensures the appropriate function of interactive interface – which is a similar process for the personal space for humans. This raises a question of whether a

machine also requires personal space in a similar manner to individuals in order to regulate and optimize the input and output of information between oneself and the external environment.



Figure 13: Public Anemone

3) Projects on the theme of personal space

Projects on the theme of personal space can be further categorised as asserting for the need and awareness of personal spaces in *Man – machine relationship* and *Man – man (interpersonal) relationship*.

a) Man – machine relationship

Design Noir projects refer to the social aspect of electronics, and have the themes of control, personal space and subversion. It addresses the relationship and cultural interaction between man and electronic devices. The invasion of everyday human life by technology is addressed in their work *faraday Chair*. Fried develops this theme further into the concept of Social Defence Mechanisms that protects individuals from unwanted technological interventions in the technology prevalent society.²⁸ She argues that electronic devices increasingly distract and annoy people and that the electronics industry has had little incentive to address the problem. Her projects concentrate on the protection of personal space from technological disruptiveness: invasion of personal space by unfamiliar electronics, similar to the physical intrusion of personal space that takes place in interpersonal interactions. There are also variations that protect *metaphysical* and *physical* privacy.

*Media-sensitive Glasses*²⁹

The concept of Media-sensitive Glasses resembles that of *Please Wait* in the sense that it protects the perceptual and cognitive territory inside a person's head. This is a pair of glasses that darkens the sight when a television is in view. By doing this, it protects the ideational personal space of the user from distraction. This project protects the psychological and cognitive privacy of the wearer, by keeping the personal space inside the individual's head intact. EyeTap project by Steve Mann, a wearable device that automatically replaces billboard advertisements in sight with

mind-calming images, also gives a similar effect to Media-Sensitive Glasses.



Figure 14: Media-Sensitive Glasses

*Faraday chair*³⁰

A conceptual project of a space shielded from electromagnetic transmissions in a form of a glass cage surrounding a human body. It depicts the current society as prevailed by electronic communication, no air around us being free from the invasion and pollution of electronic transmissions. This project provides a personal space where an individual can be protected from this invasion. However, the personal space provided in this protect is static and exceptionally small, not in adjunct to the property of personal space addressed by Hall as being portable and 0.5 – 2 meters wide around the individual. This project can be considered to be protecting the physical privacy of the user.

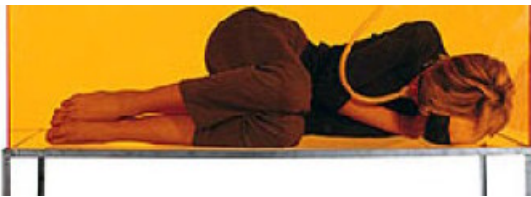


Figure 15: Faraday Chair

*Wave Bubble*³¹

Wave Bubble is a mobile-phone-looking device that acts as RF jammer and disables the use of wireless communication devices near the user, creating a sphere of silence that is four meter in diameter. This protects the personal space by preventing others to use electronics such as mobile phone, so that user is not disturbed by loud chatting of others in their personal space. This resembles strongly the characteristics of personal space as being portable and that it creates a personal sphere of four meters around the individual. This project does secure the personal space of the user from unwanted use of electronic devices as intended by the producer, however, remains negligible and vulnerable to physical intrusion of others in the personal space that happens more commonly in everyday life.



Figure 16: Wave Bubble

b) Man – man (interpersonal) relationship

These projects can also be grouped into metaphysical and physical protection. Dunne argues Sony Walkman to be the first technological device that allows the embodiment of personal space.³² Walkman allows the user to bring their own micro personal space to urban environment, controlling their immediate personal environment by means of music and being undisturbed by background noise.

*SpaceMaker*³³

SpaceMaker enables the user protect his personal space by concentrating on his own bodily presence in a chaotic environment. It produces music and light based on the user's biological information such as heartbeat. This concept is similar to what Sony walkman enables the users: create and bring around one's own small world regardless of his environment in order to protect the individual's inner psychological personal space.

There seems to be relatively very few projects, if any, that focus on the physical intrusion of personal space and personal territory in the field of media technology. As one of these few examples, we would like to describe and discuss our media technology installation *Have-A-Seat*, raising awareness of the need for physical personal space.

5. Have-A-Seat

Have-A-Seat is a media technology installation project addressing the issue of the need for personal space and public territory in public space. It raises the awareness in the users about the inherent proxemics needs of both others and their own that usually remain unaware through the use of the installation.



Figure 17: Have-A-Seat

5.1. The concept

Have-A-Seat is a seemingly normal sofa that deals with the behavioural patterns that arise when people in a public space try to create some personal space around them. When there are two persons sitting on the sofa the sofa 'breaks' apart and the two seats ride away from each other. As soon as one person leaves the sofa the two seats will come together and again form a seemingly normal sofa. Have-A-Seat emphasises these behaviours by enlarging the natural reaction of persons when two strangers sit down next to each other. At the same time the installation gives the users their desired personal space and so raising awareness of this unconscious desire of the users.

Have-A-Seat project deals with the interactions between strangers in public space for a purpose of having a rest on a seat for a limited amount of time. This falls into the personal spacing between strangers in a non-conversational situation, typically requiring 18 inches of personal space in between individuals. The cultural norms employed in the installation is of North-western Europe. The applicable concepts of proxemics for this project is personal distance between strangers (personal space) and public territory (territory behaviour, particularly Occupancy by society type and of stall variation). The sofa is divided equally into two, since there is no prioritized ownership of the bench in public space: the first user equally divides the bench with the second user, as mentioned earlier as a characteristics of public territorialization.

5.2. Implementation

1) Construction

Have-A-Seat detects the occupancy of the seats by pressure mats installed on top of the each seat, and is operated by a mechanical force when separating the two seats in case they are both occupied.

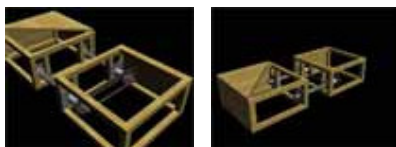


Figure 18: Have-a-Seat construction model

It utilizes a drive system that works with a custom adapted electromotor and a custom adapted control box. The motor features a built-in stop mechanism which is connected to the sensory system.



Figure 19: Mechanics of *Have-A-Seat*

The two sofa consists of wooden frames: one of them has four wheels attached to it and the other holds the motor. The sofa is filled with polyether foam.



Figure 20: Sofa construction

2) Safety issue

The motor used for *Have-A-Seat* installation is so powerful that it does not stop when a limb is trapped between the two parts. In order to avoid injury of the user of the system, a thin wooden panel is installed between the two sofas. When the wooden panel is lightly pressed, it stops the motor from moving the two sofas together. There is also a button that can be pressed to manually stop the motor movement.



Figure 21: Safety mechanism

6. Discussion

In this paper, we have explored the idea of privacy and public space, and its treatment in the field of design and media technology. We defined privacy as an interpersonal attracting and distancing force that ensures comfort and social order. Thus, its awareness is crucial in design and in social life. Personal space and territory are particularly important in interpersonal spacing, and its application has been surveyed. From the discussion, it can be concluded that in the area of media

technology projects, there are projects of considerable number and variety dealing with the informational privacy (intellectual and personal information) and attracting aspect of distance optimization (human connectedness), however, there are relatively few projects in the separating aspect. The importance of the separating aspect of human distancing can be observed from the literature review of privacy, personal space and territory, and thus deserves more consideration. There are a few media technology projects dealing with the theme of human disconnectedness,

however, most of these few examples concern the Man-machine relationship or metaphysical privacy, but not the physical private space. In this sense, Have-A-Seat claims a unique position in the discipline, raising the awareness for the need of physical interpersonal distancing in public space.

Acknowledgements

Many thanks to Jan Groupe, Leo Nugteren and Ridder BV for technical and resource support, and Maarten Lamers for advice and his wise words.

¹ Altman, Irwin, *The Environment and Social Behaviour: Privacy, Personal Space, Territory, Crowding*, The University of Utah, Wadsworth Publishing Company, Monterey, California 1975

² Fast, Julius

³ Also called *Kinesphere*.

⁴ Hediger, 1950

⁵ Sommer, 1969 p. 26

⁶ Hall, E. T., *The Hidden Dimension*. Anchor Press. 1966

⁷ Ruhleder, R.H

⁸ For instance, a train delay or crash, or a flood hitting a village.

⁹ Park, Burgess, & McKenzie, 1925; Thrasher, 1927; Whyte, 1943; Yoblofsky, 192, Zorbaugh, 1929

¹⁰ Brower, 1965

¹¹ Lyman and Scott, 1967

¹² Goffman, 1971

¹³ Newman, 1972

¹⁴ Ley & Cybriwsky, 1974

¹⁵ The protection of private information has been a major concern in the development of ubiquitous computation, networking and communication protocol. An example of studies dealing with this issue in the field of Computer Science is: *Designing for Privacy and Other Competing Requirements* by Eric Yu and Luiz Marcio Cysneiros, 2002

¹⁶ Julie Stewart-Pollack and Rosemary M. Menconi, *Designing for Privacy and Related Needs*, 2005

¹⁷ *Territory-Based Interaction Techniques for Tabletop collaboration* by Stacey D. Scott, 2003

¹⁸ *Constructing Social Spaces in Virtual Environments: A Study of Navigation and Interaction*, by Phillip Jeffrey and Gloria Mark, 1998 and George Robertson, *Data Mountain: Using Spatial Memory for Document Management*, 1998

¹⁹ Stefan Agamanolis, *New Technologies for Human Connectedness*, ACM interactions, vol. 12, no. 4, July - August 2005, pp. 33 - 37. Project executed by Joëlle Bitton, Céline Coutrix, Stefan Agamanolis, Human Connectedness research group, 2005

²⁰ Stefan Agamanolis, *New Technologies for Human Connectedness*, ACM interactions, vol. 12, no. 4, July - August 2005, pp. 33 - 37.

²¹ Marion, Barbara, Anwar, LIACS, Leiden University.

²² Beth Mynatt, Human Connectedness

²³ Dipak Patel, Aoife Ní Mhóráin, Stefan Agamanolis, Human connectedness research group, Media Lab Europe, 2003

²⁴ Mann, s., Excerpt from Prof. Mann's Keynote Address at the Virtual Reality Conference in Rio de Janeiro, June 1-6, 1998

²⁵ Adam Whiton, Yolita Nugent

²⁶ David Merrill, MIT Media Lab, *Head-Tracking for Gestural and Continuous Control of Parameterized Audio Effects*

²⁷ By Cynthia Breazeal, Andrew Brooks, Jesse Gray, Matt Hancher, John McBean, Dan Stiehl and Joshua Stickon, *Interactive Theatre*, 2003

²⁸ Limor Fried, *Social Defense Mechanisms: Tools for Reclaiming our Personal Space*, 2005

²⁹ See endnote 28.

³⁰ Anthony Dunne, 1999

³¹ See endnote 28.

³² Donne 2001, p. 45

³³ Elizabeth Sylvan