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**Social Interactions in
Computer-Mediated Public Spaces**

By

Kai-Feng Cheng

A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Philosophy

In

Architecture

and the Designated Emphasis

in

New Media

in the

Graduate Division

of the

University Of California, Berkeley

Committee in charge:
Professor Yehuda E. Kalay, Chair
Professor Galen Cranz
Professor Kimiko Ryokai

Fall 2011

**Social Interactions in
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Abstract

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Doctor of Philosophy in Architecture, with Designated Emphasis in New Media

University of California, Berkeley

Professor Yehuda E. Kalay, Chair

Place-making in public spaces is an important and worthy objective in the field of architecture. Sense of place is rooted in the dynamic interaction among people, space and activities. Hence, scholars observed human behaviors in successful public spaces and explored how the physical environment supports users' goals, expectations, activities and social interactions. Consequently, designers adopted the findings of these studies and created inhabitable public spaces in the urban area in which activities are diverse, social interactions are plentiful and sense of place is attached.

What distinguishes public spaces from private spaces is the interaction partners. In public spaces, people interact with strangers whereas in private spaces, users participate in interpersonal behaviors with acquaintances. However, the ubiquitous use of digital media devices has blurred the line between public and private spaces. It modifies human behaviors and produces new genres of public spaces: the socializing private space and the privatizing public space. In the socializing private space, people participate in public activities and interact with strangers in social networking sites, online video games and news forums while the body is physically situated in private environments, e.g. home; whereas in privatizing public space, through digital media devices, users isolate themselves from other participants and build private zones to interact with acquaintances in physical public environments, such as local coffee shop and urban plazas. The juxtaposition of public and private life has challenged the existing theories of place-making in public spaces.

Following the step of previous studies in social interactions and public spaces, this research adopts behavioral observations as the major methods to investigate current public spaces. Different types of computer-mediated public spaces were selected and examined. After careful

investigations and analyses, the findings of this research pointed to two directions. On one hand, in the same type of computer-mediated public spaces, the ability to closely observe the interaction partners facilitates social interactions and enhances sense of place. If users are able to perceive more visual cues of appropriate behaviors, they experience better social interactions and attach sense of place to the environment. On the other hand, each type of computer-mediated public spaces is equipped with its social potentials and design problems. Although users somehow experience perception and interaction difficulties in the socializing private space due to the limited visibility to the interaction partners, the worldwide social pleasure, unexpectedness and exclusive activities associate the environment with sense of place. In the privatizing public spaces, people are able to directly sense, consciously understand, and automatically response each other; however, their ignorance of physical surrounding decreases sense of place.

Therefore, by learning from different types of computer-mediated public spaces, the outcome of this research contributes to the design of both physical and virtual public spaces. It provides practical suggestions to the designs of information technologies as well as spatial designers. Furthermore, the analysis scheme and experimental process of this research extend the methodological approach for the future research of social interactions in public spaces.

Dedication

This dissertation is dedicated to my parents, Hugo Hsin-Kao Cheng and Phoenix Fong Hsu.

Mon and Dad, I love you! I could not have completed this step without your fully support and encouragement.

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Chapter 1 Introduction

1.1 Background

The advent of digitally mediated communication is having a profound effect on social life in public spaces. On one hand, the ubiquitous use of digital communication devices in public spaces has diminished public life: while talking to remote acquaintances on the phone, occupants of the public space mentally confine themselves within the media devices, isolate themselves from their physical context, and ignore the social situation around them. They are accessible to their remote companions but ironically, unreachable by those who are physically surrounding them. In effect, the media has “privatized” the public space.

On the other hand, digitally mediated communication has “socialized” private spaces. New networking technologies extend the territory of public spaces by bringing people together in “electronic proximity,” connecting people who are not physically co-located. This new public space is an alternative environment fabricated of information for people to participate in economic, cultural, educational and social activities. (Dreyfus, 2001; Kalay, 2004; Mitchell, 2004). Without being physically present, people are still able to participate in activities in public sphere by joining discussions in online forums. Although the information space is not constructed of physical materials, they have the characteristics of a place, such as immersion, habitation, presence, memorable experiences and social meanings. (Anders, 1998; Dyson, 1998; Wertheim, 1999) In this aspect, the information space becomes a new frontier for spatial designers to create livable environments.

However, the social experiences in this emerging public space are different from those in the traditional physical ones. When people gather in the new kind of socializing public spaces, they lose the visual cues that guide their interaction. Individuals cannot directly observe the physical appearance of the surrounding persons, or visually perceive their responses. The absence of visual cues among the interacting parties hinders the sense of social presence and raises new kinds of social behaviors.

In order to investigate solutions to current public spaces, this research aims to explore social experiences in the computer-mediated public environments. More specifically, it examined the sense of social presence and social interactions in different types of public spaces where individuals have different degrees of ability to observe each other. This research is completed via a two-step experiment. After a close examination on behavioral patterns in public spaces, this research provides both spatial and technology designers with a better understanding of digitally mediated social behaviors, and consequently the methods to improve the design quality of the new sociable environments. Furthermore, it contributes to the study of social interactions and public environments. The experiment process and the analysis scheme provide future research in several disciplines with an effective methodological approach.

1.2 Underlying Premises and Hypothesis

Two premises ground this research. First, the art of place-making in public spaces involves not only physical forms but also social life. Scholars who investigated place have pointed out that sense of place is derived from the interaction among the space, the users’ conception and their

activities (Canter, 1977). Steele extended the space from physical attributes to social and cultural features (Steele, 1981). Social and cultural environments play an equally important role as the physical setting in the creation of sense of place. It is evident that social factors cannot be excluded from the discussion of place-making.

Second, although several sensory channels enable people to perceive the environment, the sight plays the most important role in the success of social interactions in public environments. Not only does the visual sense provide the richest information flow about the social situation, but it also integrates with our ability to respond to the social environment. Throughout their lives, people have developed the ability to quickly pick up visual cues from the environment, unconsciously interpret them and then automatically response. This innate ability is evolving because of the constantly interaction with digital media, and is likely to play an increasingly more important role in human interactions in the future.

These two premises narrow the scope and the hypothesis of this research. The purpose of this research is to explore social experiences in computer-mediated public spaces. This study begins with the hypothesis that more visibility to the interaction partners leads better social experiences, hence increases the sense of place. Under this hypothesis, this research identifies the independent variable as visibility to the interaction partners, and the dependent variable as social experiences, specifically, the degree of sense of social presence and the process of completing social interactions. The end goal is to apply theories from environmental behaviors to the design of sociable virtual worlds and, in return, leverage the lessons learned from these sociable virtual worlds to improve the design of physical public spaces.

1.3 Methodology

This research is completed with three milestones. First, I looked at the definitions of theoretical terms: place, place-making, public spaces, social presence, social interactions and digital media across various disciplines. This step grounds the research with a common vocabulary. Next, I conducted a two-step experiment. In the experiment, social interactions and behavioral patterns in public space are observed and recorded. Finally, I analyzed the data collected from the experiment, and discuss essential elements that facilitate social experiences and sense of place in different types of public spaces

The best way to explore social interactions and behavioral patterns is through unobtrusive observations. In the past decades, researchers in different fields investigated urban public spaces by observing human behaviors in them (Goffman, 1963; Whyte, 1980; Lofland, 1998; Marcus and Francis, 1998). This research follows their approach and adopts observation as the major method to scrutinize social experiences in public spaces. Based on the degree of visibility, the ability to visually sense the interaction partners, there are three types of social presence in today's public realms: *copresence*, *tele-copresence*, and *telepresence*. Several public spaces falling into these three categories are selected as the observation target. Previous social interactions studies in public spaces also helped to identify what to observe and how to record data. Both individual and interpersonal activities are included in the recording list. Maps, descriptive behavioral notations and photographs are used to record social life in public spaces.

1.4 Outline

This thesis comprises three main parts- literature review, methodology and findings. Part I consists of three chapters, each of which reviews a fundamental concept of social experiences in public spaces. The review of previous studies begins with place-making in public spaces. In Chapter 2, the qualities of place are first described. Chapter 2 also covers the definition of public space. This research adopts a broader understanding of public spaces and includes semi-public spaces, such as shopping mall and coffee shop, in the discussion. Under such definition, a public space is an environment that everyone has equal access to it and in which users interact with strangers. Connected to the qualities of place, the details of place-making mechanism in public spaces are also discussed.

The theoretical discussion is shifted to social experiences in Chapter 3. Social experiences comprise of two levels: 1) the sense of social presence and 2) social interactions. The sense of social presence is defined as the sense of being together with others. It is the first step of building social experiences. Social interactions occur only when individuals are able to perceive the presence of other people around us. The details of social interactions, including the perception-reaction loop and the coding/decoding system of human interactions, are also covered in this chapter. Furthermore, this chapter explores the role of the visibility to interaction partners. The success of social experiences highly depends on the visibility to interaction partners. Not only do visual cues provide behavioral reference for interacting with others, but they also are exploited as a tool to present self-identity in public spaces. Finally, Chapter 3 also reviews previous studies of social experiences. I was able to design and develop the methodology to investigate social presence and social interactions according to those studies.

The discussion in Chapter 4 focuses on the information technology and digital media. It covers different types of media and the revolution of digital technology. The chapter explores the challenge that digital media poses to social experiences and public spaces. Specifically, the absence of visual cues in mediated interactions decreases sense of social presence and hinders the success of social interactions. Also, the uses of digital media have created two kinds of new public spaces -- socializing private spaces and privatizing public spaces. The socializing private space refers to those online public spaces where users participate in social interactions with strangers while physically located in a private space, e.g. home. The concept of privatizing public spaces describes the alternation of current public spaces. While physically located in public spaces, people participate in private activities in virtual worlds through portable digital media devices instead of interacting with strangers around us. The juxtaposition of public and private life has challenged the existing theories of place-making and social interactions in public spaces. Furthermore, this chapter also classifies computer-mediated public spaces based on the degrees of visibility to the interaction partners. The case studies of copresence, tele-copresence, and telepresence environments are also covered in this chapter.

Second part of this thesis raises and discusses methodological issues of this research. Based on prior studies of social experiences reviewed in Chapter 3, a two-step experiment is designed and explained in Chapter 5. In the first step, I selected two successful public spaces in Berkeley area as observation targets. The purpose of this step is to explore users' expectations and

activities in current public spaces. Since digital media have proliferated in our everyday life, it is necessary to re-examine the theories of place-making in public spaces discussed in Chapter 2. The second step is to observe different types of computer-mediated public spaces. Two copresence environments, four tele-copresence environments and one telepresence environment are selected as the experimental environments. These environments share the same attributes of public spaces- users have an equal access to them and interact with strangers in them. However, the degrees of the visibility to interaction partners are varied in these environments. These environments with different degrees of visibility become a pool to test the hypothesis. This chapter also discloses the data collection process. This research collects both quantitative and qualitative data for the measurement of social presence and social interactions.

The final part consists of two chapters. Chapter 6 discusses the findings and Chapter 7 covers lessons learned from the observations. Behavioral patterns in current public spaces are first explained in Chapter 6. It also describes the role of visibility in different types of public spaces. After analyzing quantitative and qualitative data, it is evident that in the same type of environment, the degree of visibility is the key factor in social experiences. However, the hypothesis is only partially proven. The role of visibility is not clear when cross-examining social experiences in different types of public spaces. The complexity among copresence, tele-copresence and telepresence environments cannot be generalized by the visibility. Therefore, in order to deeply understand different types of computer-media public spaces, a four-dimension analysis scheme is created. Functional, conceptual, perceptual and behavioral appropriateness are applied to measure sense of place and social experiences in different types of computer-mediated public spaces.

This thesis concludes in Chapter 7. After applying the four-dimension scheme to three types of computer-mediated public spaces, I found that none of copresence, tele-copresence and telepresence environments are better than each other, but they are just different. Each of the environments has its potentials and problems. By learning from each other, this research concludes with suggestions to spatial designers and developers of information technology. This chapter also covers the significance of this research and future research directions.

Chapter 2 Place-making in Public Spaces

This chapter aims to ground the scope of this research. It reviews the theories of place-making and public spaces. First, this chapter defines place and reviews factors that turn a space into a place. In the second part of this chapter, the discussion shifted from place to public spaces. It defines public spaces and elaborates the relationship between people and public spaces. Finally, connected back to the first and second part, this chapter concludes with a list of the essential components of place-making in public spaces.

2.1 Space and Place

This section aims to answer the following questions: What is place? What are the elements that distinguish place from space? Specifically, this section identifies the factors that turn a space into a place as *place identity, place attachment, social process, memory and uniqueness*.

2.1.1 Definition of Space and Place

Space is a physical structure for arranging spatial, social or temporal objects. Under this definition, space is a container for activities and cultural and aesthetic expressions (Lefebvre, 1974; Hillier, 1996; Harrison and Dourish, 1996; Chen, 2006;).

Steel defines sense of place as *“the pattern of reactions that a setting stimulates for a person”* (Steel, 1981). In his model, sense of place is an interactional concept. It derives from a dynamic and complex interaction between human and the environment, including the physical setting (trees, furniture, and other physical objects) and the social setting (who is in the space and what are they doing). People enter an environment with their own conceptions that express through their actions, and then the environment gives feedback to people. This process creates meanings, such as feelings, memories and behaviors, which associate with the setting and makes an environment a place.

2.1.2 Factors That Turn a Space into a Place

Distinctions between space and place help us understand the sense of place more deeply. A wide range of disciplines, such as geography, anthropology, architecture, sociology and psychology, shares the same interest in the subject of “space” and “place”. Scholars in these fields have distinguished “space” from “place” based on their disciplinary perspectives. For example, Hidalgo and Hernandez talked about place attachments (Hidalgo and Hernandez, 2001). Proshansky described place identities (Proshansky, 1978; Proshansky et al, 1983). Tuan focused on human experiences (Tuan, 1977) and Lynch paid attentions to cognitive images (Lynch, 1960).

In general, “space” and “place” are co-dependent (Tuan, 1977). Places are spaces that have psychological, social, cultural or historical bonds between human and the setting. Under this definition, places are in spaces and they cannot exist without spaces. According to Harrison and Dourish, *“a place is a space which is invested with understanding of behavioral appropriateness, cultural expectations and so forth”* (Harrison and Dourish, 1996).

The study of “space” and “place” is rooted in contemporary phenomenological studies about bodies, senses and subjective experiences (Relph, 1976; Casey, 1997; Manzo, 2005). Most of the work was built on Heidegger’s (1958) notion of “being-in-the-world” and Merleau-Ponty’s (1945) concept of “body schema”. Human body is an intentional being made of not only flesh but also emotions. It plays a crucial role in perceiving and interacting with the external world. A place emerges when body experiences a space. Like Harrison and Dourish described, “*We are located in ‘space’, but we act in ‘place’*” (Harrison and Dourish, 1996). Manzo also proved similar point by interviewing forty participants in an experiment place meaning (of what?). She found that for each participant, the meanings of a place are created because the *experiencing-in-it* occurs (Manzo, 2005). This interconnection between human body/experience and space/place seems to attract great interests in various disciplines, such as Tuan and Relph in geography, Hidalgo and Hernandez in psychology, Whyte and Lefebvre in sociology, Nora in history, and Lynch and Cooper Marcus in design and planning.

I will review the topic of “space” and “place” based on the five themes shown in Table 2-1.

Approach	Literature	Description
Place Identity	Lynch, 1960; Relph, 1976; Tuan, 1977;	Place can be identified
Place attachment	Cooper Marcus, 1970; Hidalgo and Hernandez, 2001; Vaske and Kobrin, 2001	There are emotional bonds between people and places
Social process	Lefebvre, 1974	Place is the product of social process
Memory	Nora, 1996	Place is memorable
Uniqueness	Baker, 1958; Jorgensen and Stedman, 2001	Some activities take place only at specific time and in a specific place

Table 2-1. Differences between space and place

▪ **Place identity**

A “place” is understandable and can be represented, while a “space” is more abstract.

The use of the term “place” leads to an environment that can be identified and represented by occupants (Lynch, 1960; Relph, 1976; Tuan, 1977). Relph, the pioneer in the study of “space/place,” distinguished between “space” and “place” by the concept of *place identity*. According to him, space is amorphous, intangible, and indescribable, whereas place is a concept that can be explained, analyzed and understood (Relph, 1976). The components used to identify places are the physical setting (space), activities (body/experience) and the interrelated meanings. Although the combination between any two components may contribute to the sense of place, only the fusion of all three elements constitutes *identity of place*.

Tuan’s book, “*space and place: the perspective of experience,*” is the seminal literature about space/place. He defined the relationship between “space” and “place” as *knowing*. He argued that the moment that a space transforms into a place is when people get to know it better and endow it with values. For example, when a family moves to a new town, it is just a space for them to live because everything is strange and unfamiliar. Over time, they begin to know more about this town, such as the landmarks, roads and directions, and eventually, what was once an unknown and abstract space (town) becomes a place filled with significances (Tuan, 1977).

Another way to characterize a “place” is *legibility*, also called *image-ability or visibility*. Legibility means that an environment has the power to evoke a strong image in the observer’s mind. In

order to discover the *legibility* of an environment, Lynch developed *cognitive mapping* methods (Lynch, 1960).

A cognitive map is the visual representation of a person's knowledge about a space. When people interact with an environment, the environment leaves an image in our mind. Over time and through experiences, the image built up and gets updated. This image helps us identify the uniqueness and distinctiveness of this environment from other spaces. After interacting with the environment further, people are able to generate a diagram, a sketch map, or a plan that represent the mental image.

According to Lynch, the analytical framework for understanding this mental image includes three interdependent components. The first component is the identification of objects. These objects can be categorized into five types -- paths, edges, districts, nodes and landmarks. The second component is the structure expressing patterns and relations among the five types of objects. The third component is the practical or emotional meanings of these objects. The combination of these three components serves as the core for understanding the *legibility* of a large-scale place, such as a city or a community.

- **Place attachment**

A “place” has bonds with people, whereas a “space” has no connection with people.

A place has meanings to human. These meanings drive people to feel a sense of belonging to the place and be responsible to it (Cooper Marcus, 1970; Steele, 1981; Hidalgo and Hernandez, 2001; Vaske and Kobrin, 2001). *Place attachment* refers to an emotional feeling that a person has relating to a place (Steele, 1981). This emotional bond maintains the closeness between people and the place, making people a part of the place (Cooper Marcus, 1970). Psychological study has shown that home and the community of home provide people with a strong feeling of place attachment (Hidalgo and Hernandez, 2001). This study has shown that people attach to home because it provides us with a sense of security, comfort and being in control. Because of these feelings, people feel responsible for the environment and compelled to maintain it (Vaske and Kobrin, 2001).

However, although we usually imply that the place attachment toward to a place is positive, it is possible that a place has a negative meaning. In that case, people tend to stay away from the negative place (Whyte, 1980; Manzo, 2005). For example, in a metropolis, areas that close to homeless shelters and service have always been identified as chaotic and dangerous. While passing close to those areas, people tend to lock their door and walk faster than usual.

- **Social process**

A “place” is formed through experiences, while a “space” is composed of physical entities.

Although the term “space” has different meanings in different disciplines, from the spatial design point of view, the definition of “space” is limited to the three-dimensional (or four-dimensional if one includes time) structure in the physical world. Consequently, “place” is the production of human experiences, including behavioral and social, and “space” is a group of the physical objects (Tuan, 1977; Lefebvre, 1974).

Lefebvre defined “*space as a social process.*” Although he used the term “space” in his articles, what he referred to is actually comparable to what other scholars called “place.” He described

“place” (he actually stated it as “space”) as a precondition and a result of social processes (Lefebvre, 1974).

Any place is the result of the interconnection of three layers of spatiality -- *spatial practice*, *representations of space* and *representational spaces*. The first layer, *spatial practice*, explains that bodily interactions with the environment help us to produce a “place”. The second layer, *representations of space*, is tied to the representations of people’s belief systems and to the institutions and organizations that assert social hierarchy and social order onto a place. The third layer, *representational spaces*, identifies that place is directly lived through the images and symbols that incorporate with human activities and events in everyday life (Lefebvre, 1974). In this sense, “place” is rooted the everyday experience that takes place in a society.

- **Memory**

A “place” is filled with symbols associated with a person’s past, whereas the objects in a “space” have no significance.

When individual enters or acts in a place, the symbolic entities trigger his memory about the history of himself or the society where the place is in (Lefebvre, 1974; Nora, 1996). Nora provides the theme, *memory*, to distinguish between “space” and “place.” According to Nora, “places,” which he called *lieux*, are material, symbolic and functional (Nora, 1996). Under this definition, “place” provides enough symbolic representations, whether material or non-material (behavioral/social), that triggers the spatial memory of any one or group of people. The spatial memory occurs when an individual’s stored memory is unconsciously activated because he enters a space or makes repeated actions that are associated with his past.

- **Uniqueness**

A “place” is unique and “space” is generic.

There is no identical place, no matter how similar their physical forms are alike (Kalay, 2004). The uniqueness of a place is derived from the special situation (physical, social, or temporal) in the place and leads to exclusive activities that can only occur in the specific space at the specific time (Baker, 1958; Jorgensen and Stedman, 2001).

Barker developed a behavioral model called *behavior setting* to identify the uniqueness of a place. *Behavioral setting* is an environmental-behavior unit characterized by patterns of activities that can occur only within a specific time interval and spatial boundary (Ittelson et al, 1974; Chen, 2006). Examples of behavior setting are dormitory lounge at Friday night and weekly farmer’s market in a city plaza. The temporal and spatial uniqueness of the behavioral setting forms a special situation in which only limited activities can occur. For example, the Bay to Breakers, an annual event that takes place in May in San Francisco, attracts 110,000 participants and has been the largest footrace event since 1986. People from worldwide come to San Francisco to view, to join and to win. This event is not a regular footrace event, but is the only time yearly that participants are allowed to dress costumes and to consume alcohol while running around the city. Although there are several footrace events happening intentionally (internationally?), the spatiotemporal restraint of the exclusive behavior is one of the reasons that the city of San Francisco is incomparable.

Jorgensen and Stedman have also illustrated similar theme. After surveying over two hundred participants, they concluded that aside from the cognition about and affection toward a space, *behavioral exclusivity* also contributes to the sense of “place” (Jorgenson and Stedman, 2002).

2.1.3 Summary

To summarize this section, if we see “space” as three-dimensional structures in which objects can be organized and in which events and activities can occur, then “place” can be created inside the “space.” According to the discussion above, the main differences between “space” and “place” are: *place identity, place attachment, social process, memory and uniqueness.*

2.2 Public Spaces

The discussion in this section shift from place theory to public spaces. It defines public spaces and discusses the nature of public spaces. Furthermore, this section explores the relationship between people and public space. To be specific, the expectations, motivations and activities that people have toward public spaces are elaborated.

2.2.1 Definition

A public space can be defined as an open area, usually in an urban region, where all citizens, regardless of gender, age, race or social-economic level, have access to it. Examples of public spaces are Sproul Plaza on Berkeley campus or Rockefeller Center Plaza in New York City. Although public spaces usually refer to environments outside of buildings, such as streets and plazas to name a few, they actually also include indoor spaces (Whyte, 1980). For instance, the lobby of a building can be a public space. Some spaces, such as subway platforms or public libraries, are closed at night. Since this curfew applies to everyone and does not exclude any specific person or group of people, these spaces are also classified as public spaces.

“Private” is a term that has an opposite meaning to the word “public”. Generally, public spaces are more accessible or visible than private spaces (Lofland, 1998). Under these criteria, a private space can be defined as an environment that is not open, accessible or fully visible to the general population.

However, there is also a broader definition of public spaces that includes semi-public and semi-private spaces. These spaces are usually owned privately but opened to everyone. Although the space is supposed to be open to everyone, there are activity restrictions. Take shopping malls as an example. Everyone can enter a shopping mall and browse products without the obligation to buy, but the owner of the mall has right to refuse someone to enter if his or her actions are unrelated to shop. Meanwhile, in order to keep costumers coming, the owner has a very high tolerance to unrelated activities unless they are disruptive, disturbing or criminal.

This research adopts the wider definition. All kinds of public spaces are included in the discussion regardless the owner is private or public sectors.

2.2.2 The Nature of Public Spaces

Lofland defined the public space as *the world of strangers*, whereas the private space as the world of household, friends and intimate acquaintances (Lofland, 1998). Under this definition, people engage with strangers in public spaces. In private spaces, people communicate with

someone, as Lofland called *personal-knowing others*, who we have personal connections (Lofland, 1998).

Lofland also identified the distinction between strangers and personal-knowing others. In the book, "*A world of strangers*," she referred strangers in public spaces to "*any person who we personally unknown but visually available to us*". On the other hand, by personal-knowing others, she meant someone who we have knowledge about his personalities or history. We gain knowledge about a person usually through sharing a space or information with him (Lofland, 1973). However, this familiar-ness with someone is constantly changing. Over time, the knowledge about someone is always accumulating, updating, or even discarded. Therefore, someone who was a stranger might become a personal-knowing person and vice versa.

We seek guidelines (or references) on how to act properly when first entering an unfamiliar environment (Goffman, 1959; Moskowitz, 2002). However, given that public spaces are occupied with strangers, how do we discover the references? How do we act appropriately while inhabiting the public space? In private spaces, we can easily obtain the behavioral clues by observing or asking personal-knowing others. In public spaces, however, people usually engage in interactions with strangers. Individuals need some guidelines to understand the social situation in order to interact.

Therefore, another group of people, *categoric-knowing others*, serves the role to convey behavior appropriateness and guide us to act properly in public spaces (Lofland, 1973). Lofland defined categoric-knowing others as someone we have knowledge only about his role and social status in a society. By classifying this person into a category, we can transform an unknown environment into a partially familiar world. It then becomes easier to act in the public space (Lofland, 1973; Moskowitz, 2002). For example, when we see a uniform-wearing police officer driving a patrol car on the street, we classify the environment with him as law-enforced so we will follow the traffic regulations more carefully and stop fully at stop signs.

The conceptual transformation from strangers to categoric-knowing other requires certain coding/decoding skills that we usually learned from prior interaction experiences. I will describe the coding/decoding skill with more details in the next chapter along with theoretical review of social experiences.

2.2.3 What People Want from Public Spaces

Researchers from different fields have paid attentions to urban public environments since the 70s. By unobtrusively observing human behaviors for more than a decade, these researchers have discovered that public life is full of fun and pleasure (Whyte, 1980; Lennard and Lennard, 1995; Lofland, 1998; Cooper Marcus, 1998).

People come together in public spaces for social and civil reasons (Lenard and Lenard, 1984). Public environments, such as a street and a plaza, are accessible to everyone in a city; where we fit into crowd; where we see and hear each other; where we help other persons; and where we present ourselves. Through watching and listening to other people, we are entertained as well as feeling less alone. Being in public also provides opportunities to receive and transmit information with other people. By engaging in conversations with a wide range of people, we can practice our social skills and learn multiple perspectives.

The public space is a complex product of modern society. It is where people come in and enjoy the social and civil life (Lenard and Lenard, 1995). From the perspective of spatial design, a successful public space has to incorporate numerous factors. For example, natural elements, such as sunlight, trees and water, provide an oasis for people to temporary escape from work. Architectures with different styles line the historical path of a city. Public arts satisfy human’s desire for beauty. Interpersonal activities entertain people as well as make people feel less lonely (Whyte, 1980; Lennard and Lennard, 1995; Lofland, 1998; Cooper Marcus, 1990). Thus, a comprehensive study of public spaces has to incorporate various points of view such as psychological, sociological, historical, architectural, etc. Since the sense of place is derived from body experiences. In this section, I will emphasize on the occupants’ needs and activities in public spaces.

▪ **Motivation**

Although human behaviors are not simply goal-oriented, the discussion on human behaviors still needs to take motivation and intentions into account (Ittelson, 1974). The initial reason driving people to leave the private domain is physiological needs. For example, before running water was installed, women needed to gather by the river to wash clothes and to obtain water for household use. In the modern society, people need to work in order to feed ourselves; we need to shop for groceries in order to sustain ourselves; we need to purchase clothes in order to keep warm.

However, satisfying functional need will not keep people in public spaces. We dwell in a public environment for long period of time for pleasure. Humans are social beings and the desire for constant interpersonal contact is in our gene. The spontaneous social contact with other people in public spaces brings us pleasure (Whyte, 1980; Heeter, 1992; Lenard and Lenard, 1995; Lofland, 1998). For example, making eye contacts or smiling to each other would make us feel less alone. Helping others with short conversations or information exchange would enhance our self-esteem.

Furthermore, unlike private spaces, where we are familiar with everything within it, public spaces are full of unexpectedness. People have opportunities to glimpse interesting senses, encounter unusual objects, view spectacles, discover historical fabrics and enjoy diversities. These visual excitements also provide public space occupants with another dimension of pleasure (Cooper Marcus, 1990; Lofland, 1998).

▪ **Activities**

The activities people perform in public spaces are derived from the motivation (Table 2-2).

Type	Activity	Description
People-people	People-watching	Observe other people
	Fit into the crowd	Feel less alone
	Social	Interact with each other
People-environment	Scene-viewing	Observe the visual complex in the environment
	Events	Engage in fun, interesting or informative activities, e.g. market, performance and vendors

Table 2-2. Activities take place in public spaces

The most important factor that keeps people in public spaces is interpersonal behaviors, as Whyte claimed that “*what attracts people the most, it would appear, is other people*” (Whyte,

1980). The other set of activities is people-environment behaviors, such as scene-viewing and participating in joyful events. Through experiencing these social and visual activities, people attach meanings to the space and identify the environment as “place”.

There are three types of people-people activities occurring in public spaces. First, the most common activity in public space is to watch other people. This people-watching activity occurs because there is a theater metaphor in public spaces (Whyte, 1980; Lennard and Lennard, 1995; Cooper Marcus, 1990; Lofland, 1998).

When being in public, people are both actors and audiences at the same time. As an audience, we are able to observe diverse activities simultaneously. Examples of these activities are toddlers learning to walk, lovers expressing their affection or fighting with each other, and young women dressing stylishly. Meanwhile, as actors, we enjoy presenting our values to the public through our clothes, our positions and our behaviors.

Second, in public spaces, people tend to stay in the crowd or move within it (Whyte, 1980). For example, many UC Berkeley students rest on the Memorial Glade (the lawn in front of Doe Library) and most of them cluster together. Another example, while walking on a crowded street, people tend to stay within the main pedestrian stream. This is because being surrounded by other people creates the sense that we are part of the group and less alone.

Finally, another people-to-people activity in public spaces is the interaction with others, including acquaintances and strangers (Whyte, 1980; Lofland, 1998; LaFarge, 2000). A large proportion of people in public spaces are in groups. These people meet, talk, laugh, and then exchange farewells to each other. When interacting with strangers, people politely respond to others with facial expressions and body movements (Whyte, 1980; Lennard and Lennard, 1995). Other than body language, casual conversations are also featured in everyday encounters with stranger. Small chats occur as assistance and response to restrained helpfulness (Lofland, 1998). It is commonly found in public space that people request time or direction, and others provide aid with minimum words, simply responding as “Yes” or “No”.

Besides people-people activities, people also enjoy the quality of physical environment in public spaces. Public spaces are full of diverse physical objects. A large number of people simply stay in public spaces to stare at a small piece of a building, sculptures, shopping windows, fountains and graffiti (Lofland, 1998). Another people-environment activity takes place when there is a special event, including market, festival, speech or performance. While encountering these special events, some people prefer to actively participate. For example, they dance with the performers or touch and evaluate the display items. Others might enjoy the event more passively by just standing and watching. Either way, the event is a stimulus that has vivified the public space (Whyte, 1980; Lennard and Lennard, 1995; Cooper Marcus, 1990).

2.3 Place-making in Public Spaces

Given the theoretical ground of place and public spaces, this section argues the methods of place-making in public spaces. It first defined a successful public place as the most-used environment in an urban area, and then concludes this chapter with essential elements of place-making in public spaces.

2.3.1 What Is a Public Place

The term “public space” has been defined as an area that is accessible, available and visible to everyone. In a public environment, everyone has equal right to occupy, to speak and to act. However, as there are distinctions between “place” and “space”, public spaces and public places indicate different atmospheres in the environment. In general, “public places” are the most-used environment in urban areas (Whyte, 1980). Because public places convey a sense of “place”, people select to enter and tend to spend longer in public places than in public spaces. Thus, the quickest way to distinguish public places from public spaces is the aggregation of occupants (Figure 2-1).



2.3.2 How to Enhance Sense of Place

The previous section explains sense of place. In the field of spatial design, a more practical question has emerged accordingly: how to improve sense of place?



Figure 2-1. A public place (above) should full of people and activities whereas a public space (below) are empty (Whyte, 1980; Lafarge, 2000)

To elaborate the method of place-making, Kalay has proposed that the environment needs to be appropriately arranged. This concept involves functional appropriateness (objects in the space need to be arranged to support activities) and conceptual appropriateness (the forms in the spaces need to meet users’ expectations) (Kalay, 2004). Places derive from the connectedness between human and spaces. The formation of the connectedness is rooted in the intention/expectation of entering a space as well as the behavioral experience in it. We enter a space with initial goals: to perform a particular activity and expectations: to enjoy pleasure and satisfy psychological needs. After interacting with a space through time, we bond ourselves to this specific space and attach emotional, behavioral, social or cultural meanings to it. Then a space becomes a place. Take a conference room as an example. The goal of entering a conference room is to meet and discuss issues with other people. We expect that the objects and their arrangement will help us to achieve this goal. During the meeting, we experience and interact with the physical environment (the room itself) and the social environment (the communication with others), building and updating the knowledge about the conference room. After having meetings in the same conference room several times, the conference room is no longer a regular conference room but a unique place to have a delighted discussion.

2.3.3 How to Turn Public Spaces to Public Places

From the literatures of space, place and public space discussed previously, substantive items to achieve functional appropriateness and conceptual appropriateness in public spaces are listed in Table 2-3.

Place-making methods	Description	Sense of place
Functional appropriateness		
Affordance	Support multiple activities	
Flexibility to special events	Support events that take place only at specific time and place	Uniqueness
Conceptual appropriateness		
Visual pleasure	Visual complexity that can used to represent and identify the place	Place Identity
Historical layer	Buildings or symbols associate with users' past	Memory
Social pleasure	Create triangulation	Product of social process
Emotional bonds	Provide joy, secure or unexpectedness	Place attachment

Table 2-3. Place-making in public spaces

▪ **Functional appropriateness**

In order to achieve functional appropriateness, the arrangement of objects in public spaces needs to support both regular activities and special events.

1) Affordance:

The support for multiple uses is the main factor of a successful public space. Public spaces are full of people performing diverse activities simultaneously. A well-design public space is able to accommodate a wide variety of users and their activities (Lennard and Lennard, 1995; Cooper Marcus, 1990). To achieve this, spatial designers have to carefully imagine the use pattern and manipulated design elements, such as walls, stairs, and plants, to fit the use pattern. For example, physiologically comfortable seats placed in the correct location will not only invite people to enter the environment, but also support people-watching activities and social interactions. Natural elements, such as trees and water, change the microclimate. By carefully select and place the natural elements, people feel more comfortable to stay in the public space with trees.

2) Flexibility to events with spatiotemporal restrains:

The fact that some activities are only allowed to perform at a specific time and space attaches a sense of uniqueness to the environment. To accommodate these special activities, the physical objects in the environment have to be flexible enough. For example, Murphy Avenue in downtown Sunnyvale, California is a street with full of restaurants. Every Wednesday during the summer, the regular street is transformed into a stage. Cars and street furniture are moved away and a stage is erected, so that people are able to occupy the street, enjoy the music and dance. The flexibility of physical objects allowed the events to occur and attract people to enter the environment (Figure 2-2).



Figure 2-2. Murphy Avenue in downtown Sunnyvale is a regular street (left); every Wednesday in the summer, the street is turned into a stage for a music event

- **Conceptual appropriateness**

Conceptual appropriateness deals with the relationship between users' expectations and the form of the environment. In public spaces, users expect to meet visual and social stimuli. Therefore, the shape of the space has to feature visual complexity and historical symbols, and also encourages social interactions to achieve positive overall experience in the environment.

- 1) Visual pleasure

It has been identified that people visit public spaces for scene-watching. Specifically, we are anchored in public spaces because of visual complexity of aesthetic, unexpectedness or ironic objects (Cooper Marcus, 1990; Lofland, 1998). Artistic items in public spaces play an important role in attracting people. The existence of art in public space satisfies people's desire for beauty. People seek visual attraction in public spaces, so we can attach ourselves to it both physically (e.g. sitting or lounging) and symbolically (such as staring at or standing near). By conducting a study with time-lapse camera of six thousand users in ten urban plazas, researcher found that ninety-nine percent of the activities in a plaza take place near physical artifacts (Cooper Marcus, 1990).

- 2) Historical layers

The historical layer is another element related to scene-watching. The juxtaposition of physical objects from different era composes an interesting view to attract people in public spaces (Lofland, 1998). Public spaces are always evolving. Buildings and development projects are constantly renewed. In this sense, the existence of historical elements, such as building with different styles or street furniture with different materials, remind people of their past experiences and connects people to the environment.

- 3) Social pleasure

People expect to interact with others in public spaces. A good public space needs to encourage people-people activities. A method to stimulate interpersonal behavior is to create a triangulation. Whyte (1980) defined triangulation as "*the process by which some external stimulus provides a linkage between people and prompts strangers to talk to each other as though they were not*" (Whyte, 1980). A triangulation can be a person or a physical object. The presence of a street performance and the appearance of an artwork are the visual center. They encourage people to gather together and begin to chat.

- 4) Emotional bonds

Place is a space where people have personal bonds to it. After visiting and acting in a successful public space, people have emotional attachment to it. The overall experiences needs to provide the user joy, unexpectedness and sense of secure. The elements that create joy and unexpectedness are covered in previous discussion. For sense of secure, it is self evident that only secure and well-maintained public spaces will tempt and keep people coming. For public space inhabitants, the ability to view the entire environment provides a sense of security. Before deciding to stay in a public space, people observe the social environment first. The occupation of undesirables, such as winos, homeless and low proportion of female occupants

indicates problems in the environment. A clean and well-maintained public space conveys a sense of safety (Whyte, 1980; Cooper Marcus, 1990).

Chapter 3 Social Experiences in Public Spaces

This chapter focuses the discussion on social experiences in public spaces. First, it explains social experiences in public spaces. The cycle of social interactions, theories of social presence and the mechanism of social interactions among strangers are reviewed. Second, the discussion shifts from social experiences to the role of visibility. This part covers the importance of sight in social interactions as well as visual cues in public spaces that help people decide how to react to the environment. The final part of this chapter reviews previous work of social presence and social interactions. The literature review of social experiences provides the methodological approach of this research.

3.1 Social Experiences

This section aims to explore the cycle of social interactions and the role of social presence in human experiences. This section explains the dynamic process that people perceive and react to each other until their goals are achieved. Also, as the first step of social interactions, sense of social presence is covered in the discussion. The final part of this section lists social experiences in public spaces. Theories of civil inattention, a great dance (cooperative mobility), coding/decoding system and presentation of self are explained.

3.1.1 The Dynamics of Social Interactions

Social interactions can be described as a perception-reaction loop. Individuals perceive and interpret the surrounding others' actions then respond to these actions until each other's goal is met. The success of social interactions is rooted in a fundamental element -- the sense of social presence. It is defined as the sense of presence with the potential interaction partners. Social experiences occur only if an individual is able to perceive the accessibility of the surrounding others.

Social interactions occur when people perceive co-located with other people and sense that they are being perceived as well (Figure 3-1). When another person (the target) enters our physical proximity, we (the actor) usually categorize his physical features and predict his subsequent actions according to these features. We then decide how to react to him (Mead, 1934; Magliano, 2007). After being aware of our action, the target interprets our reactions -- i.e. categorize the actor's reactions and predict the actor's subsequent actions. He then responds to our reaction. After being aware of the target's response, we interpret his response and react to him again

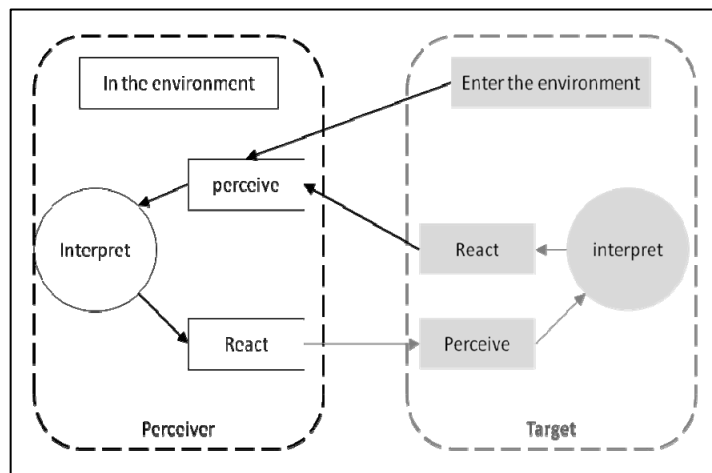


Figure 3-1. The cycle of social interaction.

(Kihlstrom, 2008). This interaction loops continuously until the result meets both sides' expectations and reaches a balance.

Compared to the perception of objects, perception of people is a more complex process because it deals with human behaviors that change from moment to moment. Therefore, in the process of people-perception, the perceiver needs more cues and inference to decipher the target's internal states, including the motive, the goal, and his/her capacity for further actions. These cues allow the perceiver to know how to judge the target, to predict future actions of the target, and to decide how to interact with the target. Furthermore, people-perception is dynamic and reciprocal. When the perceiver perceives the target, the target is also simultaneously perceiving him/her. The target will adjust his/her behaviors according to his/her perception of the perceiver, and the perceiver will also alter his/her actions according to the adjustment made by the target. As a result, a cooperative type of social interaction takes place and will continue until the shared expectations between the perceiver and the target are met.

Goffman (1963) explained that the success of social interaction is determined by the richness of information flow and the facilitation of feedback. The richness of information flow depends on our ability to observe the interacting partner and be aware that we have been seen. The facilitation of feedback depends on our ability to insightfully understand the interacting partner's attempt to act/react as well as our capacity for supporting the partner's attempt through interactions.

3.1.2 Social Presence

Social presence refers to the sense of being together with other people (IJsselsteijn and Riva, 2003; Schroeder, 2002). As the first step of people-perception loop, it plays a crucial role in perception-reaction loop and the key requirement for a successful social interaction. A higher degree of social presence leads to a deeper understanding of surrounding people, such as their ability (to interact) and mental status (intention and expectation to the interaction) (Short et al., 1976). According to Goffman, the sense of social presence, which he called *copresence*, is formed at two moments: first, when one person perceives that he is able to sense others, and second, when he perceives that others are able to observe him as well (Goffman, 1963). A successful sense of social presence depends on the close proximity between people, such that an individual can use his/her naked senses (especially the visual channel) to obtain information about another person, to perceive what another person is doing, and to experience being sensed. As Goffman pointed out the that "*persons must sense that they are close enough to be perceived in whatever they are doing, including their experiencing of other and close enough to be perceived in this sensing of being perceived*" (Goffman, 1963).

Biocca and Harm (2002) illustrated that the development of social presence in details. It involves three dimensions. Like all phenomenal states during the interactions, the sense of the cognitive, psychological, and behavioral level to the other body and mind will fluctuate social presence (Figure 3-2).

■ Cognitive level

The perceptual dimension deals with the detection and the awareness of each other. First, the existence of other sociable beings triggers sense of social presence. We perform reactions in the environment based on whether there are sociable beings in it. People identified a sociable being based on the appearance of it and the activities it acts (Biacco and Harm, 2002). The form of the interaction partners must correlate with a biological creature, such as other animals or humans. Also, the motions of a sociable being can be identified as a cue of being together with other persons. The dynamic patterns of the body provide information about what/who it is represent, and the correct response to it.

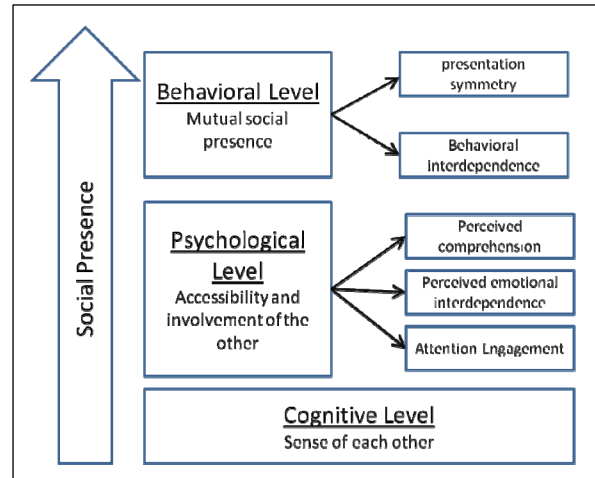


Figure 3-2. Levels of social presence.

Furthermore, social presence implies a sense of mutual perception. It is not only just sense of the other, but it is also a sense of self. An individual perceive other, and in the meantime, he perceives being observed.

■ Psychological level

The psychological dimension focuses on the sense of accessibility to others and the sense of the other participants' attention engagement, emotional states and comprehension of each other. The purpose of detecting others (described in the previous section) is to figure out whether there is a sociable being in the environment. But it is not enough. We need a stronger sense to comprehend each other, such as their intentions and desires, then predict their actions or reactions. As Biocca et al.(2003) found out that *"one key element of a theory of social presence is observer's modeling of the intentional states of the other."* One index of emotional states is the response speed (Biacco and Harm, 2002). If it takes long for the interaction partner to respond, the user identified the interaction partners' emotional state as "not interested" and "not willing to continue the interaction".

■ Behavioral level

The degree to which the other person seems to be able to interact with us is a key component of social theories (Biocca and Harm, 2002). Although social presence is similar to presence as a phenomenal state, it is sometimes defined as including interpersonal behaviors. For example, if I look to communicate, he/she looks at me back; if I approach to him/her, he/she retreats (or approaches to me, too); if I wave to him/her, he/she waves back; and etc. The underlying hypothesis is that if an individual sense his/her actions are reactions to another person's behavior and vice versa (i.e. their verbal or embodied actions are linked), they are supposed to feel that the other is social presence.

3.1.3 Social Experiences in Public Spaces

Social interactions in public spaces are even more complex than in private zones. In public spaces, people engage in the interactions with strangers with whom one has no personal relationship. Understanding each other requires some guides that individuals can use to understand the social situation. There are principles to understand and respond to each other (Table 3-1).

Approach	Literature	Description
Civil inattention	Goffman, 1963; Lofland, 1998;	Aware of existence of each other but not engaged in any focused involvement
A great dance	Whyte, 1980; Lofland, 1998;	The interaction in public spaces is a collaboration
Coding/decoding system	Mead, 1934; Whyte, 1956; Blumer, 1969; Lofland, 1973; 1998; LaFarge, 2000; Moskowitz, 2002;	Our response to other people is not toward the action itself but toward the meaning of the action; The process of interaction is a process of coding/decoding
Presentation of self	Goffman, 1959; 1963; Lofland, 1973; Rettie, 2005	To apply the coding/decoding system to our body, we are able to present ourselves in public spaces

Table 3-1. Principles people practice social interactions

▪ **Civil inattention**

Civil inattention refers to the process that when strangers are co-located in close proximity, they are aware of the existence of each other, but not engaged in focused interaction (Goffman, 1963; Lofland, 1998). Civil inattention makes social presence occur without conversations and directly interactions. It defines each others’ territory and unwillingness to do the following interactions. For example, by avoiding eye contact with each other, we sense the presence of each other and display our intention to keep a distance from strangers. However, according to Goffman, “*Civil inattention is not ignoring someone, giving them non-person treatment, nor is it uncivil attention, as occurs when one person pointedly stares at another*” Rather, it is “*an interaction in an unobtrusive and non-threatening way*” (Goffman, 1963).

▪ **A great Dance**

The interaction pattern in public spaces is a collaborative process. Whyte described the interpersonal interactions in public as *the great dance*: “*Almost everyone is on a collision course with someone else, but with a multitude of retards, accelerations, and side steps, they go their way untouched. It is indeed a great dance*” (Whyte, 1980). Lofland also defined this as *cooperative motility*, “*strangers work together to traverse space without incident*” (Lofland, 1998). What guide a great dance is the read of other people’s intentions. A skill to code and decode the movement is required when understanding each other.

▪ **Coding/decoding system**

Living in a public space requires the skill to understand and move around strangers (Lofland, 1973). People participate in interpersonal behaviors in public spaces with two levels of social skills. On one hand, through social experiences in public spaces, individuals develop the ability to correctly read behavioral cues and then to properly respond to these cues. On the other hand, they apply this ability to present identity of self. However, since interactions in public spaces are with strangers, social experiences are more complex than in a private environment. It is crucial to systemize the behavioral cues people learned from experiences in their mind -- a coding/decoding system.

People determine others' actions/reactions according to the meaning of it. Mead and Blumer described this process of identification as symbolic interactionism. Blumer explained symbolic interactionism as that humans act toward things not based on the object itself but the meaning of it. The meaning of this thing is originate from and modified through past experiences when people encountered others (Mead, 1934; Blumer, 1969). In public spaces, we are able to identify categoric-knowing people (with meanings) from strangers (no meanings attached) and perceive behavioral information from these categoric-knowing people and then act accordingly. But how do we categorize information we perceive from the world? More specially, which stranger can be transformed into a categoric-knowing person and which is not? Which category does he belong to? And according to what features? Furthermore, how would we connect the categoric-knowing person to appropriate behaviors?

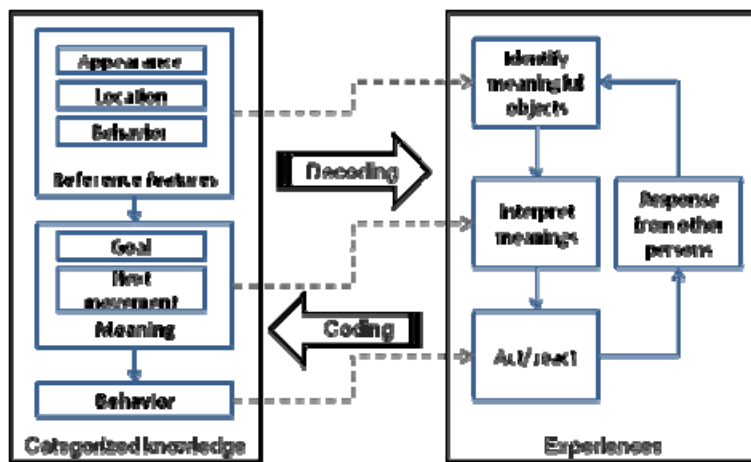


Figure 3-3. Process of coding and decoding reference cues in public spaces

The answer to these questions is easy, we are taught. The process of ordering knowledge about people in public spaces is called *coding* (Lofland, 1973). Ever since we were infants, we have begun a life-long process to categorize knowledge about everything in the world, including material objects and people. An object or a person is classified according to its/his features, the meanings of these features, and the proper behaviors toward these meanings. The features we search from an object or a person are its/his appearance, locations and behaviors. The meanings we attached to an object or a person are usually the goal or the possible sequent actions of it/him (Mead, 1934; Whyte, 1956; Lofland, 1973; LaFarge, 2000; Moskowitz, 2002) (Figure 3-3) .

The categorized knowledge of an object is derived from our initial interaction with it and modified or discarded as we interact more with similar objects (Mead, 1934; Blumer, 1969). For instance, we have been taught that male adults wearing blue uniforms, carrying guns and patrolling the street are police officers. Through time, after we have encountered more people wearing uniforms but in other professions, the way we identify a police officer or interpret uniformed people is changed.

After developing the coding system, people now have the ability to decode an unfamiliar environment by identifying reference objects through the objects' features, interpreting the meanings of these objects and recalling the proper response. For example, when we see someone suspicious around our house, we had better call the police; only girls wear skirts so a

boy should not put a skirt on; and while recognizing elder people on the bus, it would be nice to give him our seat.

▪ **How to apply the coding/decoding system to ourselves**

It is one thing to understand an object, but an entirely different thing to properly apply these behavioral meanings to us. Public spaces have provided individuals an environment to practice these social skills (Lofland, 1973; Goffman 1963). According to the categorized knowledge, people know the link between some features and possible reactions toward them. Thus, when we want to receive these kinds of response from others, we will display the correspondingly features. For example, young kids know that people will pay attention to loud voice, so when they want to get attention, they scream. After repeatedly expressing these features and obtaining expected feedbacks, over time, we have developed the skill to automatically function in social interactions subconsciously.

Goffman (1959) pointed out that interaction is a performance whereby we create impressions on others. He recognized that the social presence of an individual is not invariant but is a performance created through expressions and directed at the maintenance of a particular shared perspective (that is, the social situation). The performance may be derived from different degrees of intentions. He distinguished the performance between “*expressions given*” and “*expression given off*.” Expression given involves verbal symbols or their substitutes which “*admittedly and solely to convey the information that he and others are known to attach to these symbols*.” Expression given off is “*presumably unintentional*,” but can be “*purposely engineered*” and so can be used intentionally to deceive. The impression created by an expression depends on whether it is seen as explicit, implicit or inadvertent. The self-projection depends not only on these different cues, but also on how they are classified by the recipient.

The complexity of self-projection challenges the sense of social presence that is treated as a passive construct. (Rettie, 2005) Social presence implies an active process of information transmission. Not only are we influenced by information we passively receive from others, but also are affected by the social cues we actively send out to express ourselves and impress the surrounding persons.

3.2 Visibility and Social Experiences

In this part, I will discuss visibility, the ability to visually perceive other people and its role in social experiences. Among all sensory channels, sight is the most important and the most dominant sense. The discussion focuses on the importance of genuine visual cues in social interactions. I will begin with the role that sight plays in the process of social interactions. In the dynamic loop of social interactions, visual sense not only provides the richest information flow about the social situation, but also promotes people’s ability to respond to the social environment. The ways to develop and apply visual cues are discussed. Throughout the entire life experiences, individuals have developed the ability to efficiently identify and automatically interpret three visual features of an object or a person in the environment, appearance, locational (spatial), and behavioral references. Linking back to social experiences in public spaces, these references not only provide cues for individuals to properly react to the social environment, but also a tool to present identify of self.

3.2.1 The Importance of Visibility

People are able to perceive the environment through five senses -- sight, hearing, touch, smell and taste. Through time, individuals have developed the ability to adapt the most efficient system to perceive the world based on their goals (Medin et al, 2002). Among the five sensory channels, sight is the dominant sense because it has the farthest range and can absorb the largest amount of environmental information (Medin et al, 2002; Rodaway, 1994) (Figure 3-4). Other sensory channels usually play supplementary roles to experience the world. For example, when an individual enters an unfamiliar community, he will first visually observe the environment, such as the scale of the street, the style of the building, and the appearance and the facial expressions of other people. If obstacles obstruct his vision, other senses will play a bigger role to augment him with information about the community.

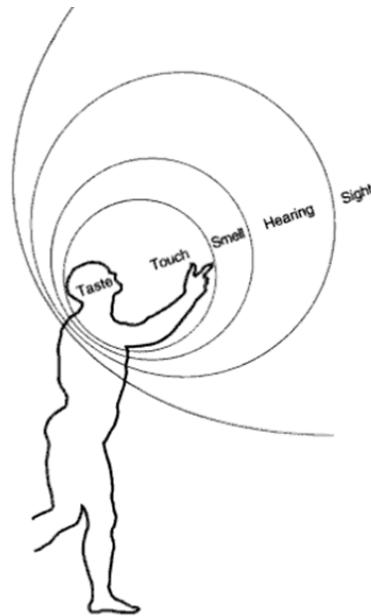


Figure 3-4. The range of sensory channels (Rodaway, 1994)

3.2.2 The Role of Visibility in Social Experiences

Sight plays an even more important role than other senses when people are acting in public spaces. Public spaces are full of strangers and unfamiliar objects. We have to absorb information more efficiently and activate the coding/decoding system more accurately than in private spaces.

When we code/decode an object, we seek the appearance, locational and behavioral features. However, in addition to these reference features, the spatial-temporal context of an object is also an important key feature to understand it (Kihlstrom, 2008). The unique combination of time and occasion leads to different meanings and appropriate behaviors. For example, when people find a lady wearing a wedding dress and walking alone on a muddy street, they will ask if she needs help. If the same lady with the same dress walks toward a church, they will congratulate her. Since the visual sense provides people with the power to view the context and details at one look, we can shorten the time it takes to detect valuable information from the environment. As the consequence, social interactions become more efficient. Furthermore,

because sight is the dominant sense, people have categorized more visual information in the coding/decoding systems than verbal information. As a result, it is easier and quicker to identify visually perceivable objects, such as signs or actions performed by a person, than interpreted those objects represented as texts or words.

In the real world, people pick up diverse visual references from natural objects, artificial items and humans to guide our own actions. For example, the color red indicates caution, so we will be more careful when seeing a sign with red graphics. A smile face implies good mood, so in a restaurant, we will prefer to order from a smiling waiter rather than an angry-looking one.

However, among all objects, other humans (and their behaviors) provide the primary visual sources in social interactions in public spaces. First of all, public spaces are sociable environment. People seek more pleasure in public space from people-people connections than from people-place connections (Lenard and Lenard, 1995; LaFarge, 2000). As Whyte claimed, *“what attracts people most, are other people”* (Whyte, 1980). Second, research in children’s behavior has indicated that it is in the human nature to find social reference from surrounding people when being positioned in an unfamiliar environment. Young kids usually pick up and imitate another person’s (usually the parent) response toward the environment (Gorden, 1995). Third, the ability to accurately foresee the interaction partner’s intentions and expectations plays a crucial role in the success of social interactions (Mead, 1934; Goffman, 1963). Psychological studies have shown that behavioral cues weigh heavier than situational cues in the understanding of interacting partners’ mind (Forgas, 2007). Finally, human visual features serve as cues to guide everyone, including us (who perceive cues from others) and the surrounding others (who perceive from us) in the environment. Thus, not only do we perceive these cues from other people, but we also employ these cues as messages to instruct others’ behaviors (Lofland, 1973; Goffman, 1963). Therefore, in this thesis, I will focus only on the cues related to human behaviors and leave other visual cues in the future.

3.2.3 Visual Cues in Public Spaces

Scholars in various areas have demonstrated the power of visual cues in the social interaction process: visual cues convey more about the sender’s mind than verbal ones; people tend to categorize more visual stimuli in the environment than verbal ones; visual cues elaborate and strengthen verbal messages when there is no conflict between them and visual cues are more powerful than verbal messages when there is a conflict between them (Short et al, 1976; Forgas, 2007; Knapp and Hall, 2007). However, I have not yet elaborated the exact meaning of “visual cues” and how they were perceived when interacting with strangers. Therefore, in this section, I will discuss the nature of visual cues and classify the visual cues people pick up in public spaces.

Visual cues are reference features of a person that remind other people the categorized knowledge during social interactions. There are three aspects to these visual cues. First, they are perceived through eye. Second, they are constructed by wordless symbols. Third, their existence guides us to appropriate behaviors. These features are covered by three types of cues -- apperential, spatial and behavioral (Lofland, 1973) (Table 3-2).

Types	Elements	Reflection
Appereantial cues	Natural-born appearance	Social status of a person
	Dress	Intention/ Personality/ Presentation
Spatial cues	Proxemics	Territory of a stranger/ Distance
Behavioral cues	Orientation	Heading to/ Goal
	Eye contact	Engagement
	Eye gaze	Focus/ pay attention to
	Facial expressions	Mental status
	Body movement	Modify the category

Table 3-2. Visual cues people pick up when interacting in public spaces

Appereantial cues refer to the physical appearance of a person including natural traits such as height, weight, skin color and gender, as well as the presentation of him, for example, clothing, glasses, hair style, and so on. In public spaces, appereantial cues carry more weight than other cues because they are quicker to be grasped. After picking up the appereantial cues, people can form an initial judgment of a stranger. The meanings of any other cues grasped later are dependent on this first impression (Short et al, 1976; Lofland, 1973; Magliano et al, 2008).

How a person dresses sometimes reflects more than social status. Based on how a person presents himself, we are able to estimate his personality, his intentions of entering the environment or how he wants to be treated (Goffman 1959; Lofland, 1973). For instance, we all have the experience of meeting someone wearing formal cloth in a casual occasion. Combining these visual cues with the spatial-temporal context, we can guess that he is on the way back or heading to a formal party (his intention), he is a strict person (personality) or he want to earn impression or respect (how he wants to be treated).

Spatial cues are sent when people want to define the territory around us. The distance between a person and the surrounding others is called *proxemics* (Hall, 1966). The proxemics classification includes four zones -- intimate (6-18 inches), personal (1.5-4 feet), social (4-12 feet) and public distance (12-25 feet). Proxemics reflects a stranger's relationship with the surrounding people and his willingness to interact with others. If someone keeps himself more than 25 feet from other people, he is not willing to interact with them, whereas if there is only a 1.5 feet distance among a group of people, they are personal-knowing each other.

Behavioral cues include other people's body orientation, eye-gaze, eye contacts, facial expression and body movement. The amount of social information perceived from behavior cues is large and dynamic. Each behavioral cue reflects different meanings -- orientation reflects the goal that a stranger is heading to, eye-gaze and eye contacts imply what a stranger is paying attention to, facial expression represents a stranger's mood, and depends on the movements of the body, we are able to modify the initial judgment of a stranger (Goffman, 1963; Lofland, 1973). However, social interactions are dynamic. While we are interpreting and reacting to the social cues displayed by a stranger, the stranger is doing the same. Since human behaviors change from time to time, the meaning of a specific behavioral cue is changing according to the process of the interaction (Moskowitz, 2005).

3.3 Research Methods of Social Experiences

The discussion in this section shifts to the research method. To be specific, this section covers the research methodology of previous studies in social presence and social interactions. The

literature review guides a direction for future research. Vast amount of prior research adopts a questionnaire to study the sense of social presence. For social interactions, scholars utilize unobtrusive observation as the major method to investigate interpersonal behaviors.

3.3.1 Social Presence

One issue related to social presence over the past decades is how and how much mediation affects an individual’s perception of one another. Swinth and Blascovich(2002) reviewed the studies of virtual environment, and commented as *“they have focused on identifying variables that affect the degree to which interactions are salient, or socially present to one another within technology-mediated interactions, virtual environment.”* Although the process of mediated interactions is ideally identical with non-mediated ones, there are fundamental differences between them, including how much social information is transmitted, how many/what kinds of social cues are conveyed, as well as whether the communication is synchronously or asynchronously. These differences are factors that may affect the degree people sense social presence and the way people interact (Table 3-3).

Testing target	Scenarios	Examples	Methodological Tools
Different kinds of media	How people feel when the communication changes from face-to-face to cell phone	Short et al.(1976): multimedia, e.g. face-to-face, voice/ audio, audio only, written	Observations and literature review
Different kinds of interactions	Wide ranges of interactions, such as casual-and-intimate, and formal-and-collaborative, or one-to-one, and one-to-many interactions	Ho et al.(1998): haptic and visual feedback	Questionnaire with 1-7 scale to indicate the level of agreement
Different kinds of interaction partners (human or non-human)	Social presence in all kinds of mediated targets, such as human, AI or NPC	Lee et al.(2006): physical embodiment and a virtual version Nowak and Biocca(2003): agents and avatars in VE	Questionnaire with 1-5 or 1-7 scale to indicate the level of agreement
Imaginary interaction partner	If there is no interaction, no response, illusory other, or non-mediated interactions	Hamman(2006): online news website	Questionnaire with 1-7 scale to indicate the level of agreement

Table 3-3. Previous work of social presence

The majority of experimental studies of social presence have adopted questionnaires to assess social presence and related constructions. Slater and Garau commented *“questionnaires inevitably result in ordinal response data, and these are typically analyzed using some variant of standard Analysis of Variance, in order to test for difference in means across factor levels”* (Slater and Garau, 2007). These studies also suggested that 1) mixing the question of interest (e.g. about social presence) between other more straightforward questions that related to people’s normal everyday life; 2) the participants is actually not paying attentions to the exact form of wording use; 3) the question structure needs to be taken into account holistically; 4) the participants do not concentrate on the questions with an analytic frame of mind (Slater and Garau, 2007).

Based on the previous studies, sense of social presence is assesses through a three-level measurement. It covers cognitive, psychological and behavioral level (Table 3-4).

- **Cognitive level**

In the cognitive level, the measurements include 1) *sense of others*: feel like the interaction partner is a real person, 2) *sense of being co-located with others*: feel like being in the same room with others, and 3) *sense of being watched*: feel like directly working with others.

■ **Psychological level: connectedness**

In the psychological level, the measurements include 1) *involvement*: how engaged was the interaction, how much attention was paid, and how intense was the interaction, 2) *affective awareness*: was I interested in, emotional, intimate, willing to share personal information, and willing to have a deeper relationship with my interaction partner, and 3) *modeling mental states of the communication partner*: was my interaction partner distant, interested in, emotional, intimate, willing to share personal information, and willing to have a deeper relationship with me.

	Measurement
Cognitive level	Sense of others
	Sense of being collocated with others
	Sense of being together
Psychological level	Involvement
	Affective awareness
	Perceiving judgment from others
Behavioral level	Interactivity
	Immediacy
	Intimacy
	Transferability

Table 3-4. Measurement of social presence

■ **Behavioral level**

In the behavior level, the measurements includes 1) *interactivity*: the ability to access my interaction partner, 2) *immediacy*: did the interaction mimic face-to-face communication with immediate feedback, 3) *intimacy*: did I try to maintain a sense of distance or a sense of closeness with my interaction partner during the interaction, and 4) *transferability*: the ability to carry interaction from one place to another.

3.3.2 Social Interactions

Classic theories of human behaviors in public spaces, such as symbolic interactionism, a great dance and presentation of self, have been discussed (see Table 3-5). Not only do they ground a theoretical basis but also a methodological approach to future study of social interactions among strangers.

Theory	Literature	Methodological Tool
Symbolic interactionism	Mead, 1934; Blumer, 1969;	Participant observations
The presentation of self	Goffman, 1959; 1963;	Observations
A great dance	Whyte, 1980; LaFarge, 2000; Lofland, 1998	Observations Time-lapse camera
A world of strangers	Lofland, 1973; 1998	Observations Interviews Literature review
The theatrical metaphor of public spaces	Lenard and Lenard, 1995	Observations; photos
People Place	Marcus and Francis, 1998	Observations; drawings and photos

Table 3-5. Previous work of social interactions

The best way to explore social interaction is the unobtrusive observation. For example, sociologist William Whyte and his fellow researchers conducted their observations on plazas, parks, streets and other urban public spaces (Whyte, 1980; LaFarge, 2000; Lofland, 1998). He suggested that designers need to create places to facilitate civic engagement and social

interactions. He also advocated a bottom-up design process that designers should adopt. The design process should start with understanding the way people use the spaces and the way people would like to use spaces instead of designing a space and hoping that people would use them as designed. Likewise, city planner Clare Cooper Marcus had observed how human behaviors and social activities are affected by the urban outdoor spaces (Marcus and Francis, 1998). According to her, the design process must start from appropriate people-based research that understands people's needs, motivation, behaviors, and interactions in public spaces. These researchers have not only provided designers with information about how people interact in public spaces, but also offered a context-sensitive method that designers and researchers can adopt.

Given the literature review, the investigation of social interactions in public spaces needs to cover how people practice, 1) civil inattention, 2) a great dance, 3) coding/decoding or make meanings of surrounding others, and 4) presentation of self. Both focused interaction, such as, verbal conversations, and unfocused interaction, e.g. directions of eye gaze, eye contacts, and postures, need to be observed and recorded.

Chapter 4 The Impact of Digital Media on Social Experiences and on Public Spaces

This chapter covers digital media and their impacts, specifically, the impact of digital media on social experiences and public spaces. First, digital technologies are covered. Various types of digital media such as mass media and person-person media are explained. Second, the discussion shifts to the impact of digital media on social experiences. It explains sense of social presence and new interaction cycle when users are interacting through digital media. Finally, new types of public spaces- socializing private spaces and privatizing public spaces are introduced. This chapter also covers case studies of socializing private spaces and privatizing public spaces.

4.1 Information Technology and Digital Media

This section aims to define digital technology and discuss the revolution of it from analog telecommunication to digitalized information.

4.1.1 Definition

The word “technology” refers to objects used to make everyday life more convenient, such as sponge for cleaning things, fire to heat food or hardware equipments used to build and repair houses. Technology can also point to a collection of techniques. For example, transportation technology includes everything related to transferring people from one location to another. The components of transportation technology include cars, highways, aircrafts, and different kinds of train systems, etc.

Scholars used different terms, such as telematics (Ascott, 2003), cybernetics (first called by Norbert Wiener), and telecommunication (Short et al, 1976; Mitchell, 2004) to name digital media. Each term may have different definition, but from the perspective of spatial design, they overlap. These terms all imply an invisible electronic network superimposed on the existing physical world which connects geographically-disperse people. Digital media are usually assembled with computer hardware, interface software and network infrastructure that allow people to communicate and retrieve information without space and time restraints. The hardware and software in sending-end and receiving-end digitize and code/decode the message. Thus, sender and receiver can understand and communicate with each other. Unlike analog media, the transmission of digital is based on the binary form, which allowed the information to be delivered correctly without errors. For example, photographs used to be taken with films. The prints and negatives degrade in quality over time. It was common to see family photo in the album faded and sepia-ized; whereas digital photos (usually shared on an online album and shown on a display device) are never aged and copies are error free. They always look as vivid as the first day they were taken.

4.1.2 The Revolution of Digital Technology

Throughout human history, the inventions of new technologies have changed public environments in various ways. For example, ancient agricultural technology gathered people together and formed the primeval public life. Medical technology has improved public and

general health so people feel safer to linger in public spaces. Transportation technology has promoted the development of suburbia so people now live away from city and participate less in the urban public life. Digital technology is not an exception. To discuss the revolution of digital technology, this section includes an older form of mass communication technology, radio and television, and then moves toward discussion of digital media, cell phone and smart phone (Table 4-1). The revolution of digital media is derived from traditional form of communication, radio and telephone, to digital media devices, cell phone and smart phone. This development of digital media includes the mixed use of media, vivid visual aids, the decline of constructing meanings and the broader accessibility and mobility of information. Each aspect influences the society and social experiences in different ways.

Type	Communication type	Visual aids	Construction of meaning	Mobility
Radio	Mass Communication (Broadcast to general population)	Audio	Filling in meanings is required	Everywhere Anytime
Telephone (landline)	Person-person communication	Interactive dialogue	Filling in meanings is required	Specific location Anytime
TV	Mass Communication (Broadcast to general population)	Audio + Video	Not necessary (the visual details are fed)	Specific location Anytime
Cell phone	Person-person communication	Interactive dialogue + Video	Not necessary (the visual details are fed)	Everywhere Anytime
Computer + Internet (smart phone)	Fusion of person-person and mass communication	Audio+ Video+ text+ dialogue+...	Depends on the environment	Everywhere Anytime

Table 4-1. Change of telecommunication technology

▪ **The Mixed Use of Media**

The most noticeable change of digital technology is the mixed use of person-person media and mass media. Mass communication and person-person communication used to be separated. Radio and TV were used to deliver mass information. The information flow was a one-way and top-down process. Government or corporations used radio or TV to impose opinions on the general public. Meanwhile, people used landline phone to perform person-person communication. Personal opinions are only circulated within a group of friends.

However, with the deployment of digital media, mass media and person-person media are converged. A single device, such as a laptop or smart phone, is now used to receive and exchange information. This facilitates civil democracy. Consumers of mass media are not passive spectators but active participants (Jenkins, 2006). This convergence enables information, both mass and person-person information, to migrate across different media platform. With personal blogs and online forums, it is possible for people to deliver personal opinions to general public without government and/or corporation interventions.

▪ **Visual Aids of Media**

Ever since the birth of telecommunication, scientists have strived to enhance the definition of media by adding more high-quality visual details. The earlier generation of media, such as radio and telephone, conveys audio-only messages. The lack of visual attractions led to lower

receiver *involvement*. For example, radio is usually relegated to background music and people tend to doodle while holding a telephone conversation (McLauhan, 1964).

Television is the first telecommunication technology that provides visual content with the messages. Although people perceive the world with all five sensory channels, we rely mostly on sight (Medin et al, 1992; Rodaway, 1994). The vivid images on television screen provide visual clues so the receiver can understand the message better and more effortlessly than audio-only messages. Furthermore, compared with radio, television provides more entertainment. The uninterrupted visual stimuli provided by television draw our attention from the reality (McLauhan, 1964; Moskowitz, 2005). As a result, people are drawn away from public spaces because it is easier and quicker to find visual pleasure on television than in public spaces.

▪ **Construction of meanings**

The development of visual aids in media has also led to the change of construction of meaning by the receivers. McLauhan separated media into the hot and cool media. The hot media are those with higher definition and require less construction of meanings whereas the cool ones are just the opposite (McLauhan, 1964). Due to the limitation of bandwidth, the earlier generation of telecommunication could only transmit low-definition information, i.e. voice. The low-definition information is more abstract and requires the receiver to fill in the meanings before being understood. On the other hand, high-definition media such as TV provide more complete details about the message and its context (McLauhan, 1964). Thus the information receiving and understanding processes are united. The receivers do not need to consciously construct the meanings of a message in order to understand it.

However, the decline of construction of meanings has caused some social problems. People absorb the information provided by television with little reasoning (McLauhan, 1964). For example, some young children cannot differentiate between reality and TV dramas. They try to imitate the actors and their actions, failing to realize that some actions are inappropriate in real world.

The information technology seems to move from being a hot medium to being a cool medium. The development of Web 2.0 aims to enhance the users' participation in the information transmission process such as sociable, collaborative and interactive information sharing. The communication technology has gone to the other direction. The newest generation of cell phone feeds users more brilliant graphical information than old ones do. In addition to transmitting audio, it also allowed users to view each other's environment (person and the background) vividly through the use of cameras.

▪ **Accessibility and Mobility**

When the user can carry telecommunication technology, it begins to have larger influence on public spaces. Each medium is designed for different purposes. These differences have caused them to have different influences on public spaces.

Mass telecommunication aims to broadcast information to a large population of people. When such device appears in a public space, it usually has a more positive impact on the public life. It provides people with not only a common attraction center (visual pleasure) but also a potential interaction stimulus (social pleasure). For example, in a sport bar, while customers are visually

focusing on the game on TV, they find common language between themselves and others. They can easily start casual interactions, including non-verbal and visual, and enjoy social pleasure.

On the other hand, person-person telecommunication technology is designed to promote more intimate interactions. This kind of portable device is usually detrimental to the public life. From telephone to cell phone, now people can carry interactions with acquaintances anywhere, including public spaces. People constantly engage in person-person communication via cell phone and ignore surrounding people. As a result, social pleasure that people sought in public spaces is now derived from interactions with acquaintances instead of strangers.

4.2 The Impact of Digital Media on Social Experiences

The revolution of digital media and its impact on the society has been discussed. Furthermore, digital media creates a specific kind of social interactions -- mediated interaction. When interactions are performed through digital media, perception and reactions are no longer automatic and embodied but conceptualized through proxy and interface.

4.2.1 Impact of Digital Media on Social Presence

Traditionally, social presence occurs in a spatiotemporal proximity in which humans are accessible, available and subject to one another (Goffman, 1963). However, as telecommunication technology evolves, it is not required to co-locate with others in a physical space, but an electronic space that allows instantaneous and reciprocal interaction. The interaction parties now can stay in a *remote distance* that they are outside each other's naked sense range, but reach each other through extending senses. The perceptual extension refers to a situation that human perceive each other through an electronic medium, such as a cell phone, e-mail or online chatting, which allows individuals to sense the mutual existence of each other from everywhere at once. As Dertouzos(1998) defined "*because proximal distance is commonly referred to as physical proximity, remote distance thus defined can be called electronic proximity.*" However, given the limitation of visibility in the virtual environment, the users have found it difficult to know other people's existence and notice their response in the electronic proximity.

▪ The visibility is limited by the output device

The power of sight and the importance of visual cues have been discussed previously. The reason why sight plays a dominant role over other sensory channels is because through vision, people can grasp largest amount of non-verbal information as well as most symbolic details. However, although digital media have provided people and the society with convenient communication method, it has robbed us the power of sight. People have the ability to see things far and wide in the real world (as long as the vision is not blocked), whereas when we adapt digital media in the social interaction, this visibility is limited by the hardware and the interface. In most cases, it is restricted by the size of the display device. It is also difficult to look at details when interacting through digital media. Unlike in the physical spaces where people are able to quickly and unconsciously control the body to catch visual details, in virtual environments, this control is dependent on the design of interface.

▪ The interaction partners are not represented as sociable beings

Since the real world is full with graphics, using more images in the virtual environment provide users with a sense of “reality”. The sense of “reality” leads to the sense of social presence (Nowak and Biocca, 2003). The ability to visually perceive the interacting partner makes the user feel the partner is not an entity but a sociable being.

Research on the human-agent interactions has demonstrated the significance of visions toward the sense of social presence. Among text, images and tactile embodiment, people found that the tactile and physically represented agent (i.e. robots) have the most positive effect on social presence. For users to sense social presence, the interface has to provide at least one simple image displaying the interaction partner in a graphic form (Nowak and Biocca, 2003; Lee, 2005). It is likely that people apply similar categorized knowledge in the virtual environments to those we used in the real world (Nowak and Biocca, 2003). Therefore, although the image does not reflect the interaction partner’s innate appearance, it does convey some reference features to guide behaviors.

In the mediated environment, media representations must reproduce social cues for us to detect and identify them as living beings. The form of the representation must correlate with a biological creature. For example, Biacco and Harm(2002) described that a graphic with vertical and bilateral symmetry shape are usually associated with human (Figure 4-1) and thus enhance the sense of social presence. Besides, the motions of the mediated embodiment can be identified as a cue of being together with other persons. The dynamic patterns of the body provide information about what/who it represents, and the affordance of it. For instance, the gender can be characterized according to how the embodiment dances and the emotional states can be recognized based on the moving speed.

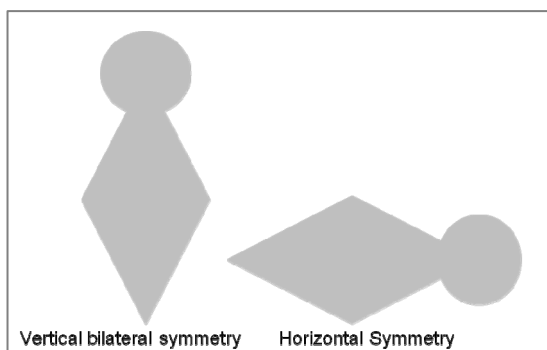


Figure 4-1. Human tend to interpret an elongated form as representation of a biological creature. (Biacco and Harm, 2002)

▪ A longer response time

The sense of social presence relies on the high *immediacy*, which refers to the speed at which a message travels back and forth between interaction partners (Short et al, 1976; Biocca and Harm, 2002; Schroeder, 2002; Biocca, 2003; Rettie, 2003). Prior research has demonstrated the importance of constant interactions to the sense of social presence in a virtual environment (Heeter, 1992). If the users receive feedback within a short period of time continuously, the sense of social presence increases. However, if the interacting partner stopped the actions and stayed idle for a while, the user will feel lonely and have a lower sense of social presence. Placing more than one interacting partners may be an easy way to raise the sense of social presence. Technology designers have developed certain methods, such as graphical representations of interaction parties (Nowak and Biocca, 2003; Lee, 2005) and placing more users in the same digital environment (Heeter, 1992) to combat this deficiency.

4.2.2 Impact on Social Interactions

I have discussed that social interactions in public spaces are with strangers. For the occupants in public spaces, the ability to visually detect feature references from the surrounding people is crucial. However, digital media has denied such ability, and people have found it difficult to successfully function in social interactions through digital media. In the following section, I will address the issues related to the lack of visually perceivable references in social interactions via digital media.

- **The absence of genuine visual cues**

Throughout our life, we have trained ourselves to subconsciously pick up visual cues from other people and automatically react to them accordingly. However, the increasing usage of digital media has created a new sense. In virtual environments, since we have to conceptualize the computer-synthesized social messages before interpreting them, and manipulate our feedback before sending it, the social interaction process through digital media is neither automatic nor intuitive.

Furthermore, Up till now, digital media are still weak in representing visual data. The huge amount of graphic data in the real world has been elaborately sorted and coded in human mind. People have paired symbols with attributes. However, the categorized knowledge of symbols and attributes is complex and varies across different cultures and societies. It is impossible to inventory the categorized knowledge and visualized it again in the digital form. Besides, the transmission of graphic data from one spot to another requires a broadband infrastructure that has not been made available to everyone in the physical world.

- **Falsely paired categorized knowledge**

The mediated nature of digital media has led to the lack of reference features. According to prior studies, people use the same coding/decoding mechanism and categories in the interactions through digital media as those in the unmediated environment (Nowak and Biocca, 2003). In physical public spaces, people seek embodied appearance, spatial and behavioral cues from other people. When interactions are in the form of digital media, human bodies are represented as text. The visual cues that people have relied on to guide appropriate behaviors have disappeared. Furthermore, even if the users adapt images to represent themselves in the virtual environment, given the weakness of digital media in representing graphic data, the pairing of symbols and behavioral appropriateness may be false and lead to wrong reactions. As a result, we have a new set of cues (verbal and visual) and behavioral appropriateness waiting to be coped. Although we have lost something when socializing via digital media, we have gained something else, such as distributed presence. The emergence of digital media gives people a remarkable freedom. With the use of digital media, people are able to participate in multiple social events with different groups of people at any given time and from anywhere.

- **New Social Interaction Cycle**

Perceptions and reactions in physical spaces are embodied -- we perceive information directly via naked senses and react with body languages. But social interactions through digital media are mediated (Dourish, 2001; Ascott, 2003; Ishii, 2003). Although the interacting partners may be real humans, when communicating through digital media, people actually interact with proxies created by machines and interfaces (Figure 4-2). Thus, when perceiving social information about other people through digital media, we are receiving synthesized data. The

representation of these data may or may not be similar to the social information that we have perceived and sorted in physical public spaces.

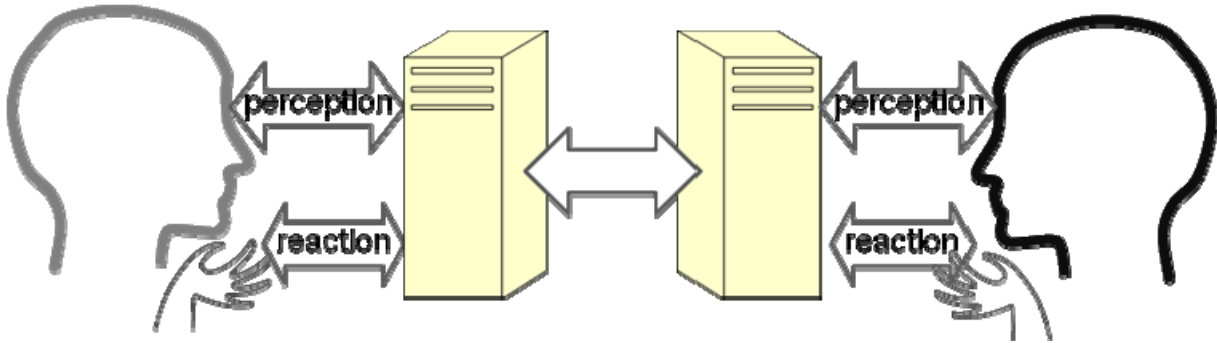


Figure 4-2. Social interactions through digital media are actually with proxies

In addition, different interfaces use different method to synthesize and represent social information. Therefore, we have to conceptualize and discover the meaning of these social data before we can react to it (Ascott, 2003; Noe, 2004). For example, in physical public spaces, when walking alone at night, a lady perceives danger from approaching footstep from behind. She then immediately responds to this situation by running away. When playing multi-user video games and hearing unusual sound, the player needs to guess whether the sound means danger. Then he has to think about how to react, e.g. by pressing a button on the mouse or any key on the keyboard. Finally, he presses the correct button on controller to respond to the sound. This conceptualized control of behaviors leads to weaken behavioral appropriateness. Therefore, the ultimate goal of digital technology is to develop a transparent interface that closely match human sensory perception and embodied actions (Fisher, 1990; Ishii, 2003). Existing digital media technology is still primitive and has not satisfied the requirements. A bottom-up design process needs to be adopted. By starting from observing and understanding people's needs, motivation, behaviors and interactions in public spaces, designers would be able to find the key elements to build more embodied interfaces that facilitate interpersonal behaviors in both physical and virtual environments.

4.3 How Do Digital Media Impact Public Spaces

Given the increasing use of digital technology, individuals are now able to simultaneously participate in various social events with remote people through electronic networking systems. Digital mediated environments are consisted of two layers -- the physical and tactile spaces that we are bodily situated in, and the virtual environment or cyberspace that we access through digital media (Anders, 1998; Compbell, 1998;

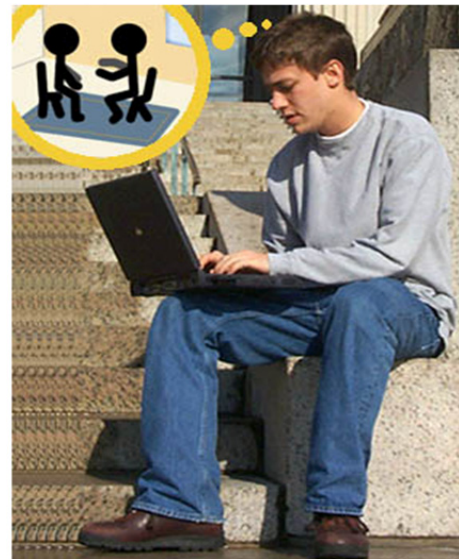


Figure 4-3. An example of digitally mediated environment: with the use of digital media (his laptop), this young man is participating in at least two social events- the one surrounding him, and the other one through digital media.

Donath, 1997) (Figure 4-3).

Digital media have created a paradoxical environment in physical public spaces -- isolation within a crowd, intimacy with remote people, privacy in public spaces, and publicity in private spaces (Cuff, 2003). This led two major changes in public spaces (Table 4-2). On one hand, the concept of privatizing public space is used to describe the alteration of current urban public spaces. Digital media have transformed the physical public space into a more heterogeneous one. With portable digital media device, people in the physical public spaces interact with acquaintances through digital devices. This provides people with the ability to work on multiple tasks simultaneously. Our bodies have expanded from where we are physically to some other spots on the Internet virtually. As a result, the encounter with physical public spaces is modified. On the other hand, digital media have created the socializing private space. It refers to the online public spaces in which users are physically located in private, but participate in social interactions with strangers. Socializing private spaces are new opportunities for people to participate in public life. Through Internet, people can actively participate in public life from anywhere at any time.

Furthermore, according to visibility, public spaces are also group as “copresence environment,” “tele-copresence environment” and “telepresence environment.”

	Socializing private space		Privatizing public space
Definition	Participate in social events in a private space, without bodily entering public spaces		People create private zones in public space
Environment	Electronic proximity		Physical proximity
Potentials	Experience social pleasure when being physically situated in private spaces		Feel emotional company form acquaintances
Problems	Mediated interactions Lack of visual cues for understanding others (and hinder the social interactions)		Mix of strangers and the personal-knowing people in public spaces
Visibility	Tele-copresence Environment	Telepresence Environment	Copresence Environment
Presentation form of interaction partners	Avatar; animation	Text and images	In person
Communication method	Synthetic face-to-face	Symbol-to-symbol	Face-to-face
Examples	Second Life, World of War Craft, and other multiplayer online games	Online forum and personal blogs	Urban plaza, street, bar, museum and other urban public spaces

Table 4-2. Types of current public spaces

4.3.1 Socializing Private Spaces

Digital media have provided people with a platform to experience public spaces in private. Through discussion in online chat rooms or blogs, people are aware of the presence of strangers and also have interaction with them. In this virtual public domain created by digital media, people practice social skills and accumulate categorized social knowledge similar to that in physical public spaces. Because people usually visit the virtual public spaces when they are actually situated in private realms (i.e. home), we have called these virtual public spaces as *socializing private spaces* (Figure 4-4).

An example of socializing private space is social networking websites such as Facebook, MySpace and Twitters. The social presence and social interactions among users in these sites are designed to simulate the interpersonal behaviors in urban public spaces. On these sites, each user has a personal webpage for broadcasting his presence and updating status. For example, users can update their status on what they are currently doing/thinking or where they are. Meanwhile, because a user can access others' (mostly strangers') personal webpage and seeing these status changes, he can sense the existence of others and perceive being together with them. By posting and answering text messages on each other's webpage, users establish social interactions with other users. Based on the visibility- the representation form of the environment and the interaction partners, there are two types of socializing private spaces- telepresence and telecopresence environment.

▪ **Telepresence**

Telepresence environment is the first generation of socializing private spaces. People are gathering in the electronic proximity and represented in the form of text (Figure 4-5). Users interact via text, which is a symbol-to-symbol basis. Examples of telepresence environment include BBS (Bulletin Board System) and MUD (Multi-User Dungeon), which were very popular in the early 90'. As shown in Figure 4-6, in BBS MUD environment, the appearance, locations and behaviors of a user are represented as texts.

As discussed above, certain degrees of visual reference are necessary in guiding behavioral appropriateness during social interactions. Therefore, users of BBS or MUD have begun to invent textual symbols to represent their status, such as (●-●) implies physical appearance (that set of symbols actually means wearing glasses), :) or :(refers to mental status (smiling or sad), *@_@* expresses eye contact, and

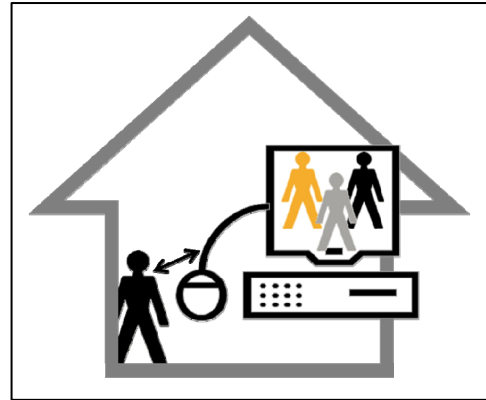


Figure 4-4. The environmental situation in Socializing private space

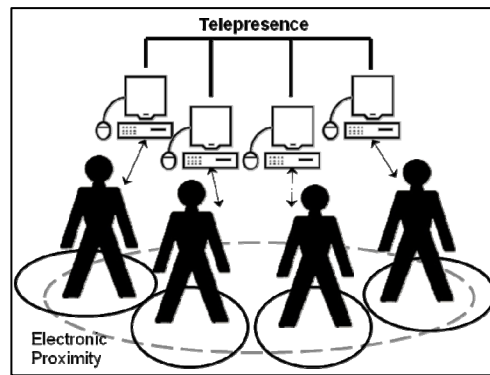


Figure 4-5. The environmental situation in of telepresence environments

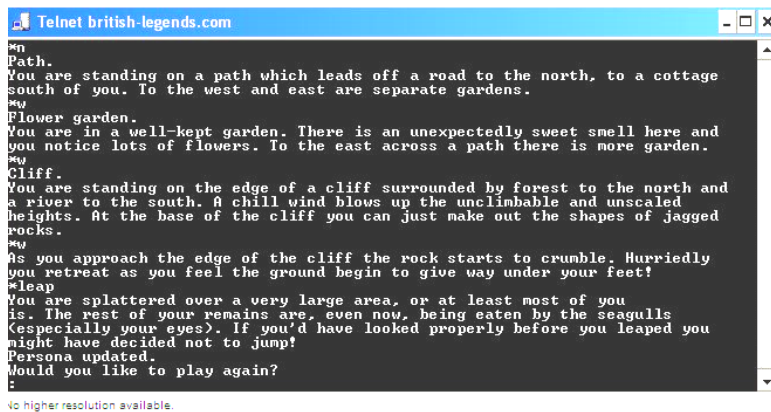


Figure 4-6. Example of a telepresence environment

Y(^_^)Y displays body movement.

As digital technology evolves, images, including real photos or abstract graphics, have been incorporated in the virtual public spaces on websites such as news forums and personal blogs (Figure 4-7). On these sites, users employ screen names and/or images to describe him and use text to communicate with each other. The language and the pictures are the vehicle to present self. When the viewer reads the screen name and looks at the pictures, he identifies the commenter as another sociable being. Furthermore, the continuously response on each other's comment maintains the sense of social presence. By checking the new comments and replies, the viewer perceives the dynamic movements of the owner. As a result, the viewer senses the existence of the original commenter and perceives being together with the owner (and with other page owners if the viewer browses their pages).

▪ Tele-copresence

The other alternative public space in the private realm is tele-copresence environment (Figure 4-8). Individuals are bodily present at separated site, but are co-located in each other's electronic proximity simultaneously. They sense each other and interact via a "synthetic face-to-face" method – a virtual environment in which the individuals are represented in the form of an avatar. One of the examples is War of WarCraft, a multiplayer online social environment. By observing the look and the actions of each other's avatar, individuals perceive social presence, and through controlling movements of their own avatar, they facilitate interaction with others (Figure 4-9).

This kind of virtual space is designed to mimic the physical environment. The environment is built with well-rendered 3D models of the physical world and the users are represented like human, with face, body, and extremities. Users can employ the interface, usually the mouse or the keyboard, to move the avatar around the world, express certain

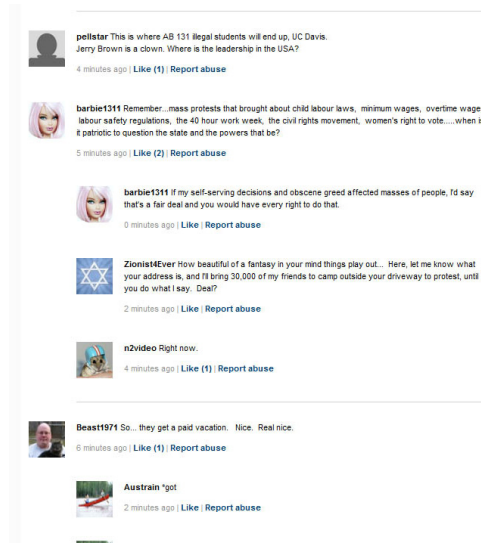


Figure 4-7. Example of user interface in a news forum (CNN)

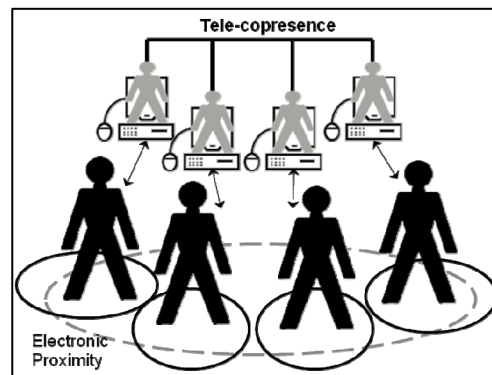


Figure 4-8. Environmental situation in tele-copresence environment



Figure 4-9. The interface of World of Warcraft (From: www.philoking.com)

body postures and facial expressions, and have conversation with others.

4.3.2 Privatizing Public Spaces

Digital media have decreased the sense of public due to the ubiquitous use of portable media devices. More and more people are using cell phones and laptops to interact with personal-knowing others in public spaces. These digital media users have ignored the strangers who are actually in their physical vicinity, and created invisible private spheres in public spaces called *privatizing public spaces* (Figure 4-10). Ito conducted a research on cell phone usage of youth in Japan. It shows that teenagers exchange intimate messages through digital media when they are physically occupying in public spaces. This continuously exchange of intimate message reduce the feeling of loneliness (Ito, 2004). Consequently, digital media devices overtake the social pleasure associated with interacting with strangers in public spaces.

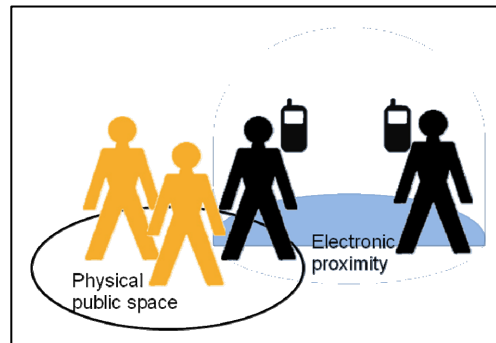


Figure 4-10. *Privatizing public space*: The individual who is using a digitally media device creates a private zone in the public.

However, the impact of digital media on public spaces is not solely negative. Developers of information technology have worked on projects to turn digital media devices as stimuli for social interactions. For example, urban location-based games, such as MapAttack!¹ and Pac-Manhattan², implement digital media devices with GPS system to demonstrate the possibility and the positive result of bringing digital media devices to public spaces. Those games motivate people to enter public spaces, facilitate social interactions, and as a result, attach meanings to the environment. Through collaboration with other players, shared memories are formed among players and the sense of place is attached to the particular part of the urban area.

In order to make a parallel discussion and comparison between socializing private spaces and two types of privatizing public spaces, a term copresence environment is used to describe the visibility to interaction partners in privatizing public spaces.

▪ Copresence

Copresence environments refer to the environmental situation that people are co-located in a physical proximity. Individuals are visible, and supposed to be accessible and available to each other. Their communication are through a “face-to-face” method -- people sense each other through naked senses (mostly through the visual channel) and react to each other with facial expressions or the body language, as discussed in Chapter 3 (Figure 4-11).

¹ MapAttack! is a real-time, location-based, strategic game. Players must be team-up with a group of 4-20 people, physically go to the assigned spots in the city based on the map displayed on their cell phone, and collect virtual points. (<http://mapattack.org/>)

² Pac-Manhattan is a real-life version of Pac-Man that takes place in the streets of Manhattan. Pac-Man and his controller communicate through the cell phone. The controller’s responsibility is to keep track of how much of the city is covered by the Pac-Man and advice how him to avoid the Ghosts.

However, although users in copresence environments communicate through a face-to-face method, they are unable to understand and react each other correctly. The ubiquitous use of digital media has hindered the communications between users in copresence. First, participants are unable to view each other's actions. Their actions and reactions are hidden behind the screen and are not visible to the physical surroundings. Second, participants are not interested in interacting with each other. Since they pay full attention on the output device of the digital media device, they missed the reference cues around the physical surroundings.

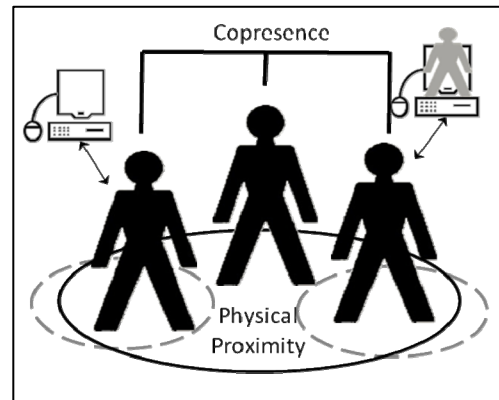


Figure 4-11. The environmental situation in copresence environments

Chapter 5 Research Design and Data Collection

Chapter 5 explains the methodological approach of this research. It begins with the research problem and the hypothesis. Then the discussion moves to the research methodology. A two-step experiment is described. Different types of public spaces selected to study social experiences are then illustrated. Finally, the methods and tool used to collect and record data are clarified in this chapter.

5.1 Research Problem and Hypothesis

The impacts of telecommunication on public spaces have been discussed in Chapter 4. On one hand, the digital technologies have challenged the place-making theories discussed in Chapter 2. With the pervasive use of handheld digital media device, the constant concentration on the communication with remote persons draws our attentions away from the physical environments. We intentionally isolate ourselves from the surrounding people and build private zones in physical public spaces. As a result, the motivation, expectations and activities people enter public spaces need to be re-defined. On the other hand, the juxtaposition of interaction partners- strangers and categoric-knowing people (in physical environments) and personal-knowing acquaintances (through digital media) modifies the definition of proper behaviors in public spaces. Furthermore, with the development of virtual public sites, such as multi-user video games and social networking sites, people are now able to participate in the public life and enjoy social pleasure while bodily situating in the private zones. The distinction between public and private spaces is blurred. Thus, the methods to create public places need to be reconsidered.

	Copresence	Tele-copresence	Telepresence
Description	People gathering in a physical public space	People gathering in a simulated environment	People gathering at an online forum
Interaction partner	In person	Presented as avatar	Presented as text
Interaction form	Face-to-face	Synthetic face-to-face	Symbol-to-symbol
Independent variable			
Degree of visibility	High	Middle	Low
Dependent variables			
Social presence	High	Middle	Low
Social interaction	High	Middle	Low

Table 5-1. Hypothesis of this research

This research began with the hypothesis that in computer-mediated public spaces, the visibility to the interaction partners is the key factor in social experiences. It is assumed that higher degree of visibility leads better social experiences (Table 5-1). To be specific, among copresence, tele-copresence and telepresence environments, users in copresence environments experience the highest sense of social presence and most social interactions because they are allowed to visually perceive each other through the face-to-face interaction; whereas users in telepresence environments experience the lowest sense of social presence and fewest social interactions because they are physically separated and interact via text. The text-based interaction is a symbol-to-symbol communication and requires an extra step of conceptualization.

5.2 Where to Observe

As discussed in Chapter 3, observation is the most common method to investigate social interactions in public spaces. This research follows this approach and adopts unobtrusive observation as the primary method to collect data. This section illustrates the public spaces selected to scrutinize social interactions.

5.2.1 Step 1: Observations on Successful Public Spaces

The first step of this research is to observe successful public spaces. The purpose of this step is to re-examine the theories of place-making and social experiences discussed in previous chapters. The finding of this step will be used as the basis to analyze computer-mediated public spaces in the second step.

After a careful investigation, I have found two public spaces as the observation target -- Café Strada next to the UC Berkeley campus and Peet’s Coffee located on the 4th street, Berkeley. Both Café Strada and Peet’s Coffee are well known as most-used public spaces in the city of Berkeley, CA. These two spaces are usually crowded with diverse users and social interactions are plentiful. The fact that some people use handheld media devices in these two spaces neither hinders social interactions nor reduces the sense of place. Instead, these spaces are full of interpersonal behaviors and equipped with the qualities of place.

5.2.2 Step 2: Observations on Computer Mediated Public Spaces

The second step of this research is to observe different types of computer-mediated public spaces. Three types of computer-mediated public spaces -- copresence, tele-copresence and tele-presence environments have been identified and illustrated in Chapter 4. Given this scope, several public spaces with different that fall into the categories of computer-mediated public spaces are selected as the observation target (Table 5-2).

	Copresence	Tele-copresence	Telepresence
Where to observe	Berkeley Espresso and Philz Coffee in Berkeley, California	Wii demo of West Oakland Project; Store demo of video games; lab demo of West Oakland Project; Xbox Halo game online	Comments on News forum

Table 5-2 Observation Environments in Step 2

▪ Copresence environment

Copresence environments have been elaborated in Chapter 4 as the type of public spaces where individuals gather in a physical space and engage in social interactions through face-to-face communication. The main difference between copresence environments and successful public spaces (observation environments selected in Step 1) is that a high proportion of users in copresence environments primarily focus on their digital media devices instead of on the physical surrounding.

Two copresence environments near UC Berkeley campus are selected to study social experiences, Berkeley Espresso and Philz Coffee. Berkeley Espresso and Philz Coffee are composed of similar physical attributes as Café Strada and Peet’s Coffee at 4th street. All of these spaces are used as coffee shop. The function, scale and furniture layout are similar to

each other. However, the social environments are not identical. Only minimum social interactions occur in Berkeley Espresso and Philz Coffee. Since participants pay their primary focus on their personal digital media devices, their intention and actions are hidden behind the screen and become invisible. I argue that compared with the observation environments in step 1, the lower degree of visibility to the interactions partners in copresence environments hinders social experiences, and as the result, lower sense of place. Yet, under the hypothesis of this research, social experiences in copresence environments are still better than in other computer-mediated public spaces because the setting allows face-to-face communication, a higher degree of visibility to the interaction partners.

▪ **Tele-copresence environment**

Tele-copresence environments have been explained in Chapter 4 as the environment where participants mainly interact through synthetic face-to-face interfaces, i.e. through avatars, in virtual spaces. This research selects four spaces as the observation environments -- Wii demo of West Oakland Project, public demo of video games, lab demo of West Oakland Project and Xbox Halo Game online to examine social experiences and sense of place. Although these space all fall into the category of tele-copresence environments, each of them indicates a degree of visibility to the interaction partners depending on the presentation forms of the interaction partners and the types of interfaces (Table 5-3).

Setting	A	B	C	D
Where	Wii Demo of West Oakland Project	Public Demo of Video Games	Lab Demo of West Oakland Project	Xbox Halo Game
Users are together	Physically+virtually	Physically+virtually	Physically+virtually	Virtually
Form of interaction partners	In person + avatar	In person + avatar	In person + avatar	Avatar
Input Device	Wii Remote	Regular Controller	Mouse and keyboard	Regular controller
Primary focus (on virtual)	Big shared screens	Shared monitor	Separate monitors	Separate monitors
Secondary focus (on physical)	Face-to-face	Controller-mediated	Controller-mediated	None
Degree of visibility	Highest	Higher	Lower	Lowest

Table 5-3. Experimental settings in tele-copresence environments

1) Setting A (Wii demo of West Oakland Project):

West Oakland Project is a digital educational environment. The purpose of this project is to teach young children the history of West Oakland, where the Jazz culture was born in California. The streetscape and buildings in 7th street, Oakland, California were damaged by the development of BART (Bay Area Rapid Transit) system and other urban development projects in Oakland area. In order to represent the physical and social environment of the 7th street, we re-built the street through digital simulation. With the video-game like environment and avatars, users are able to wander on the street and interact with computer agents and other uses who are represented as avatars (Figure 5-1).

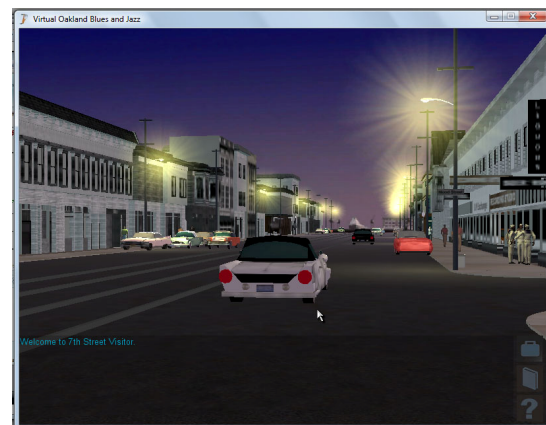


Figure 5-1. The interface of West Oakland Project

In the observation environment of Setting A, the users were physically located with a group of other users. Their interactions in the virtual world were mediated by the Wii remote³. The simulated West Oakland streets, non-player characters and users' avatars were projected on two big screens (Figure 5-2). Therefore, in this environment, users were able to view each other both virtually (from the screen) and physically (in person). Although users put their primary focus on the screens, the use of Wii remote allows the face-to-face communication in this tele-copresence environment. With the use of Wii remote, users' view to each other were not limited on the screens, but extend to the physical world. They were able to observe each other easily. On one hand, because the Wii remote is an intuitive input device, the control of actions become automatic. The extra step of conceptualizing the interface was transparent.



Figure 5-2. The environmental setting of Setting A (Wii Demo of West Oakland Project)

2) Setting B (Public demo of video games):

In order to promote their product, game console companies, such as Microsoft and Sony, usually place a few set of their product for test playing in public spaces. I observed users test playing various kinds of video games in consumer electronics retail stores.

Similar to Setting A, in the observation environment of Setting B, the users were physically together with a group of stranger and their actions in the virtual world were projected on a shared monitor. Also, users employed a regular controller to manipulate their avatars in the game environment. In



Figure 5-3. The observation environments of Setting B (Public Demo of video games)

³ Wii remote is an intuitive wireless controller. There are built-in accelerometer and infrared detections to sense the three-dimension positions of the controllers that act as extension of the users. With the Wii remote, users are able to employ physical gestures to control their avatars in the simulated West Oakland instead of the analog stick and buttons on game controllers.

addition, in this setting, only a few of users, usually two people, in the group held the controller and moved avatars on the monitor (Figure 5-3). Therefore, most users are observer. Instead of actively interacting with each other face-to-face, they simply observed the actions of players, those with controllers, from the monitor. Furthermore, for the players, by adopting the regular controller as the input device, the interactions in the game world were mediated.

3) Setting C (Lab demo of West Oakland Project):

In Setting C, users were physically gathering in a computer lab, visiting the virtual street of West Oakland Project. Each of the users occupied a personal computer and manipulated the avatar with the mouse and keyboard. Although the users were located together in one physical space, it was difficult for them to perform face-to-face communication. In this setting, the primary focus of the users was on their personal monitor on which the West Oakland Project interface was displayed. They did not pay attention to the physical world and observe the physical actions of the other users. Even if they did, the mouse and keyboard-controlled actions did not provide behavioral and locational cues for users to pick up and decode. Furthermore, the mediated interaction influences the experiences. On one hand, the simulated environment in the West Oakland Project is a new world. Users might find it difficult to discover visual cues and decode them in the environment. On the other hand, by adopting the mediated interface, the control of movements was not spontaneously. The success of communication requires an extra step of learning and conceptualizing the interface.

4) Setting D (Xbox Halo Game online):

Xbox Halo is an online first person shooting (FPS) game. It was heralded as the most popular game for the Xbox game console for nearly two years. In Xbox Halo, users work as teams to finish tasks (i.e. kill all enemies). Team members are online strangers from around the globe and randomly assigned by the system. In the environment of Setting D, users were separately located in their private spaces, e.g. home, and visited the virtual world together through avatars. In this situation, users are able to view each other only from the monitor. Besides, the input device of Setting D is a mediated interface. Users manipulate their actions with sticks and buttons on a regular controller. The problem in perception and the control of actions is similar to it in Setting B and Setting C.

▪ **Telepresence environment**

As discussed in Chapter 4, the telepresence environment is the online environment where people communicate through text. This research takes comments and response on a news forum as the observation target, I grouped users in the forum into four categories according to how much personal information is revealed. These categories include users with screen name, profile image and hyperlink to the personal profile (Group A), users with screen name and profile image (Group B), users with only screen name (Group C), and anonymous users (Group D) (Table 5-4). Each group indicates a degree of visibility. I argue that more personal information revealed indicates a higher degree of visibility, and as a result, more social interactions will occur. To be specific, users in Group A provide more personal information, such as which city they live, their interests, favorite quotes, movies. The information becomes a substitution for appearance cues and leads to better social experiences.

Category	A	B	C	D
Description	User with screen name, profile image and personal profile	User with screen name and a profile image	User with screen name	Anonymous user
Visibility	Highest	High	Lower	Lowest

Table 5-4. Experimental setting in telepresence environment

5.3 What to Observe and How to Record

This research collects both quantitative and qualitative data. As described in previous section, settings of the selected observation environments are constructed of different elements and interfaces. This affects what to observe and how to record in the environment. For physical spaces in Step 1 and copresence environments in Step 2, I observed and recorded focused and unfocused interactions with maps and photographs. In addition to the observations, interviews were conducted. For tele-copresence environments, the observations of dialogue among users and a survey were performed. For telepresence environments, I observed how users present their identities and numbers of response each user received.

5.3.1 In Step 1 and Copresence Environment

I spent twenty-four hours in each environment to observe social interactions. Maps, photographs and textual notations are used to record physical and social elements in these spaces. First, a plan was employed to illustrate the environment. Physical elements, including buildings, walls, furniture, trees and stairs are included in the plan and illustrated with architectural symbols. The numbers of total tables and maximum occupancy are also listed on the plan. Second, human behaviors, including individual activities and interpersonal behaviors, are recorded on the plan (Figure 5-4). Each symbol and textual code indicates a type of activities. The activities and social interactions not listed in Figure 5-4 are recorded with textual comments and photographs. This research is analyzed through quantitative and qualitative data.

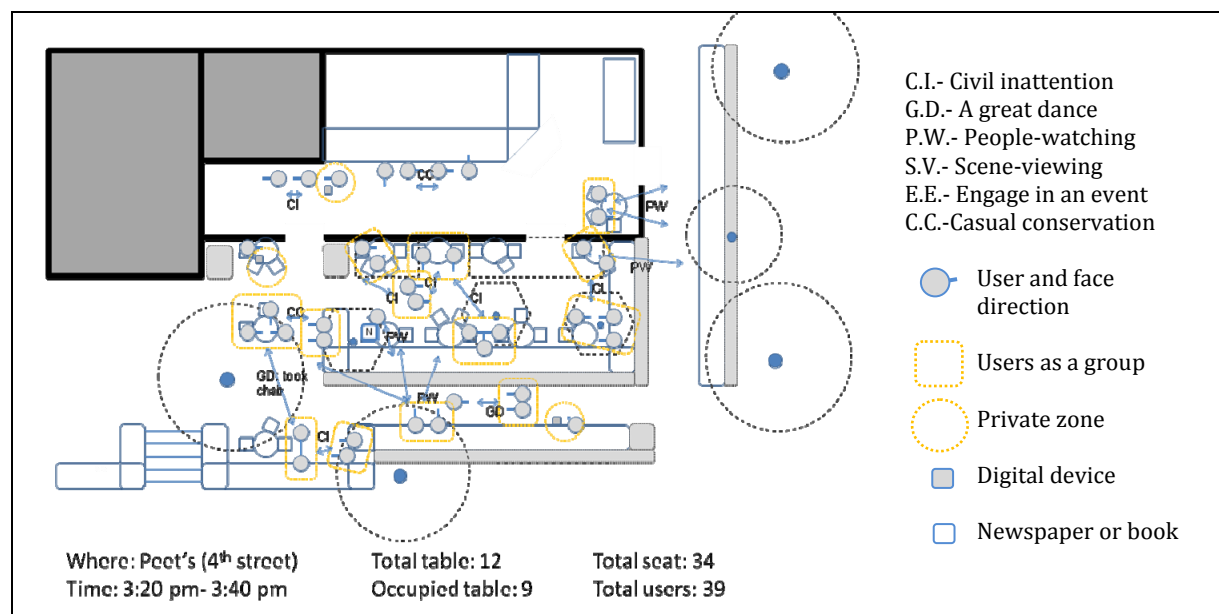


Figure 5-4. Sample of map used to record observation data in physical public spaces

▪ **Quantitative data**

To observe social interactions, I counted numbers of occupied table and numbers of users in the environment every twenty minutes. These numbers are used to calculate average usage rate. Since public places have been defined as the most-used public spaces, the high occupancy rate of the environment indicates higher sense of place.

▪ **Qualitative data**

Behavioral patterns are generated through observations and analysis. Given discussion of social interactions in public spaces in Chapter 3, in this research, I look at how people practice focused interactions, i.e. casual conversation, and unfocused interactions, such as eye contact, facial expression and proxemics. The social interaction principles and pattern found in Step 1 become the analytical basis to examine data collected in Step 2.

In addition to the observation, interviews of users in public spaces are conducted to substantiate the findings of this research. After observations, I asked users the reason they entered the environment. The outcome is used to scrutinize whether the environment provides sense of place.

5.3.2 In Tele-copresence Environment

Due to the spatiotemporal restraints, I was unable to apply one identical method to the four experimental settings (Table 5-5). Different methods were adopted to collect data for each of the four settings. I collected both quantitative and qualitative data for Setting A. Twenty-six users were asked to complete a questionnaire and comment on their experiences. For Setting B and Setting C, users’ movements in the virtual world plus their interactions and conversations in the physical world were observed. Descriptive behavioral notations and photographs were used to record data. For Setting D, I observed users’ movements and conversations in the game environment and used descriptive behavioral notations and screen shots from the display device to record data.

Setting	A	B	C	D
Methods	A survey	Observation	Observation	Observation
Quantitative Data	Questionnaire			
Qualitative Data	Comments on their experiences	Virtual world: Movements of avatars Physical world: interactions and conversations	Virtual world: Movements of avatars Physical world: interactions and conversations	Virtual world: Movements and conversations in the virtual world
Tools used to record data	Likert attitude scale	Photographs and notes	Photographs and notes	Screen shots and notes

Table 5-5. Data collection methods for different settings of tele-copresence environments

▪ **Quantitative data**

The goal of the survey in Setting A is to explore the sense of social presence and sense of place in the setting. It aims to answer the following questions -- did the users recognize the setting as a place? Did every user share the same experience? Were the users aware of being surrounded by other users? Did the visitor perceive social interaction occurring in the environment? What was the most important feature of the environment? Based on the discussion of social presence in Chapter 3, the questionnaire was designed to explore users’ memory, the sense of immersion, orientation, social presence, the control of actions, the experiences in the physical

and virtual context, and characters in the virtual world (the social context in the virtual West Oakland) (Table 5-6). To standardize the response, a Likert attitude scale⁴ was employed to measure users' feelings upon the environment.

Factors	Questions
Memory:	If I want to learn more about West Oakland in the future, I will visit this project
	I learned something new about West Oakland in the 1950s
Immersion:	I felt like I was actually "in" the street
Orientation:	I didn't know where to go when visiting West Oakland
	I felt disoriented when visiting Virtual West Oakland
Presence: (in the virtual world)	I felt like I was in the company of other visitors
	I felt like my actions were observed by other visitors
	I would miss it if my actions could not be observed
	I felt like my actions are influenced by other visitors
	I felt distracted by other visitors
	I felt like I was able to observe actions of other visitors
Presence: (in the physical world)	I observed other visitors and their actions on the screen
	I observed the actions of other visitors in the room
	I feel like my presence influenced other visitors
	I feel like my comments were welcomed by them
	Other visitors helped me learn more about West Oakland
Actions/activities:	I would miss it if I could not observe other visitors
	The physical props in the exhibit room helped me learn more about West Oakland
	I feel like I was able to control my actions (move, dance...) in Virtual West Oakland
	These actions helped me learn more about West Oakland
Physical context:	I would miss it if one of these actions was taken away
	The physical setting of the demo helped in enhancing the experience
Virtual context:	I would miss it if some of the props was removed
	The elements in the street helped me learn more about West Oakland
Bots/NPC (non-player characters):	I would miss it if one of the elements is removed
	The virtual characters in the street helped me learn more about West Oakland
Comments:	I would miss it is one of the characters moved away
	What would you do to improve the virtual world?
	What would you do to improve the physical world?
	How would you describe your overall experience?

Table 5-6. Survey questions for Setting A

⁴ A Likert attitude scale is a psychometric rating system in which the questions are represented as statements for participants to indicate their responses as the intensity of agreement or disagreement. In this questionnaire, participants check one of the boxes indicating "strongly agree", "agree", "uncertain", "disagree", "strongly disagree".

Not every participant in this setting had the opportunities to visit the simulated environment through the Wii remote. A small proportion of the users were just observers. One of the questions was included to divide users into two groups -- the Wii remote users and non-Wii remote users, so I was able to weight the control factor in social experiences. Furthermore, this survey also inquires users' previous experiences in tele-copresence environments (Table 5-7). The frequency of playing single user games and multi-player games were included in the survey. Their response to these questions provides grounds to compare and contrast between Setting A and Setting D.

When you visit the virtual West Oakland, did you use the Wii Remote? Yes__ No__
 I have experience of playing single user games: Yes__ No__
 I play video games Everyday__
 Several times a week__
 Once a week__
 Several times a month__
 Once a month__
 Several times a year__
 Once a year__
 I have experience of playing multi-user games: Yes__ No__
 I play online game? Everyday__
 Several times a week__
 Once a week__
 Several times a month__
 Once a month__
 Several times a year__
 Once a year__
 I have experience of using Nintendo Wiimote: Yes__ No__

Table 5-7. Survey questions related to users' previous experiences of tele-copresence environments.

▪ **Qualitative data**

In order to investigate the overall experiences of users for Setting A, this questionnaire also included three open-ended response questions. Users were asked to comment on the their experiences at the end of the survey. Three questions were asked specifically: What would you do to improve the virtual world? What would you do to improve the physical world? How would you describe your overall experience? The descriptive response provides analysis basis to conceive why users agree or disagree the statement in the questionnaire.

Setting B and C consist of mix of virtual and physical environments. It was necessary to observe and record social interactions in both environments. However, when beginning the observation process, I encounter some difficulties. Behaviors and interactions in the virtual world were limited by the display device. I was only able to view a part of the game world in which the players' actions are shown. The rest of the virtual world and actions of other users remain invisible. Furthermore, in Setting B, the record method is

Where: Xbox demo at Best Buy
 How many people: 17 (O1, O2....)
 How many player: 2 (A, B)

Who	Doing What	P	V	Ph
Everyone	Facing the screen	V		V
AB	Using controller	V		
A	Move forward;		V1	
A	"where are you";	V		
O1	"Left, Left";			
B	Turn around then move forward;		V2	
B	"are you in red"; "talking to you"	V		
O1, O2	"Watch out"	V		

Table 5-8. Sample of descriptive behavioral notation used to collect data in tele-copresence environments

restrained by the owner of the space, e.g. the store manager. I was unable to take screen shots or tape record the environment. Therefore, I employed a descriptive behavioral notation to record behaviors in these two settings (Table 5-8). Photographs were used as supplementary materials for me to recall the social situation when analyzing qualitative data.

Setting D is a pure virtual environment. When observing behaviors in Setting D, I was only able to view the actions of users from the display device. Similar method used in Setting B and C, e.g. descriptive behavioral notation, is employed. Instead of photographs, screen shots were taken as extra analysis source.

5.3.3 In Telepresence Environment

I collected only quantitative data for telepresence environment. I selected twenty news stories which have been published at the news website Yahoo!News (www.news.yahoo.com) for three days and observed how people commented on it (Figure 5-5). When doing the preparatory work, I realized that the news story published more than three days attracts only limited attentions and comments⁵.

The total number of comments for the news stories selected is between 267 and 55. To collect data, I recorded the number of total replies, the number of recommendations (both positive and negative) on each comment. These numbers indicate the intensity of social interactions. In order to weight and/or filter out other factors, such as the quality of the comment and the connection to the outside world, the data collected also include whether the original comment contains a hyperlink, a quotation or a citation (Table 5-9).



Figure 5-5. The interface of Yahoo!News.

Total comments: 96							
	Identity	Category	Number of replies	Number of recommendations	Hyperlink in the original comment	Quotation or citation in the original comment	Hyperlink in replies
A1	A	D	3	5	N	N	N
A2	S/I	B	5	23	N	N	Y
A3	S	C	2	6	Y	N	N
A4	S	C	0	15	N	N	N/A
A5	S/I	B	7	33	N	Y	N
A6	S/I/L	A	15	44	Y	Y	Y
A7	A	C	0	2	N	N	N

Table 5-9. Sample of data collection for telepresence environments

⁵ It is the timelessness factor to determine the newsworthiness of a news story. The more recent a story, the more attractions it draws.

Chapter 6 Observation Results and Analysis

This chapter discusses the observation results and analysis of this research. It first explains the preliminary findings, the findings in Step 1. The motivation and activities in current public spaces are described. Second, the discussion shifts to the role of visibility in each type of computer-mediated public spaces. Finally, in order to closely scrutinize social experiences and place-making in computer-mediated public spaces, a four-dimension analysis scheme is introduced. By applying the analysis scheme to the data collected in the observation process, sense of place and social experiences in three types of computer-mediated public spaces are elaborated.

6.1 Preliminary Findings

The discussion of the preliminary findings focuses specifically on the observation results in Step 1. First of all, I identified the motivation in current public spaces. People still go to public space to enjoy social and visual pleasure. However, their social pleasure has been extended. The sharing of experiences with acquaintances is another factor that motivates people to leave their private space. After observing successful public spaces in Step 1, I was able to list the activities people intend to perform in current public spaces. Individual, people-people and people-environment activities are all covered. Finally, according to the observations, some suggestions of place-making methods are described. The findings in Step 1 build a foundation for further studies.

6.1.1 Why Do People Still Go to Public Spaces

As discussed in Chapter 2, we go to public spaces for visual and social pleasure. After investigating social interactions in Step 1, I found that people still enter public spaces for visual and social pleasure. It is human nature that we need visual stimuli to fulfill some mental needs. The pleasure of seeing beautiful things and meeting unexpectedness cannot be replaced by telecommunication technologies easily. Additionally, the bodily interactions with surrounding others provide people with social pleasure. By smiling or nodding to each other, people feel alive and less alone.

Besides visual and social pleasure, people enjoy the company of acquaintances in current public spaces. A majority of participants in the Café Strada and Peet's Coffee came as a group of two or more. Although we are now able to utilize multiple tools to communicate with acquaintances, the physical contact still provides us with joy and satisfaction. In current public spaces, the experience of interacting with strangers is not alone, but a shared experience with personal-knowing people. On one hand, this shared experience helps people improve their social skills. As discussed in Chapter 4, the categorized knowledge we have developed throughout the entire life has become disordered due to the repeated mediated interactions. The constant usage of digital media devices has weakened our ability to correctly interpret the reference cues in unfamiliar environment and in the appearance of strangers. We need acquaintances to be there with us and reaffirm our decision regarding reactions to the reference cues. It was commonly found in my observations that group users pay attention to and discuss clothes, hair-style and actions of surrounding others. They achieve common

conclusion about the meaning of other people's appearances and behaviors. On the other hand, the shared experiences provide users with the sense of secure. Being with acquaintances in public spaces brings a hint of protection. Unfamiliar environments like public spaces are full of uncertainty. Friends surrounding us play the role of extended sensory channels. In the process of sharing experiences, they perceive and process the same social and physical cues with us. The fact that there is an acquaintance in close proximity, constantly reminding each other of the overlooked cues, makes people feel safe and comfortable.

6.1.2 Activities in Public Spaces

A list of activities people perform in public space is created based on the observations. Individual activities, people-people activities and people-environment activities are all included in the discussion. Several types of people-people and people-environment activities are covered in Chapter 2. This section serves as a supplementary to previous studies. Most prior studies focus on group activities. Individual activities were not included in those discussions. However, as solo users with digital media devices play a significant role in the social life of current public spaces, it is inevitable to include individual activities and the relationship between solo users and group users in the discussion of social interactions.

▪ Individual activities

Solo users usually bring something to focus on in public spaces. Some of them carry physical materials, e.g. a book, newspaper or notes; and others have a digital media device with them, such as laptop, smartphone and tablet. Only limited numbers of solo users do not hold a medium to comfort the loneliness. During each observation session (two hours) in Step 1, there was less than two solo users without an object. Oftentimes, they were actually group users and waiting to rendezvous with their acquaintances. Other solo users without something on hand tend to leave in the environment shortly. The average time they stay is less than ten minutes. Therefore, the discussion of individual activities focuses only on the findings related to solo users with digital media devices (SUwD).

1) Digital media device users tend to place themselves close to the boundary of the space:

Unlink solo users with physical materials (SUwD) disperse around the environment with no particular locational pattern, SUwD choose to sit close to the boundary of the spaces (Figure 6-1). The seats selected by SUwD are usually against the wall or at the corner of the environment, where there is less connection to the main part of the environment. This action separates intimacy from publicity. It seems that they intentionally isolate themselves from the rest of the crowd such that it becomes easier to maintain a private territory in the public realm. This spatial behavior is a substitution for protection and creates the sense of security. SUwD's attentions are fully consumed by the digital content. Their sensory channels are less sensitive and unable to immediately perceive the environment as other users. The physical division of the boundary, such as wall, bulkhead or trees, shelters a part of SUwD's body, and allow them to close their senses to the physical world. Thus SUwD feel more secure to move their mind away from the physical surrounding and dwell in the virtual world.

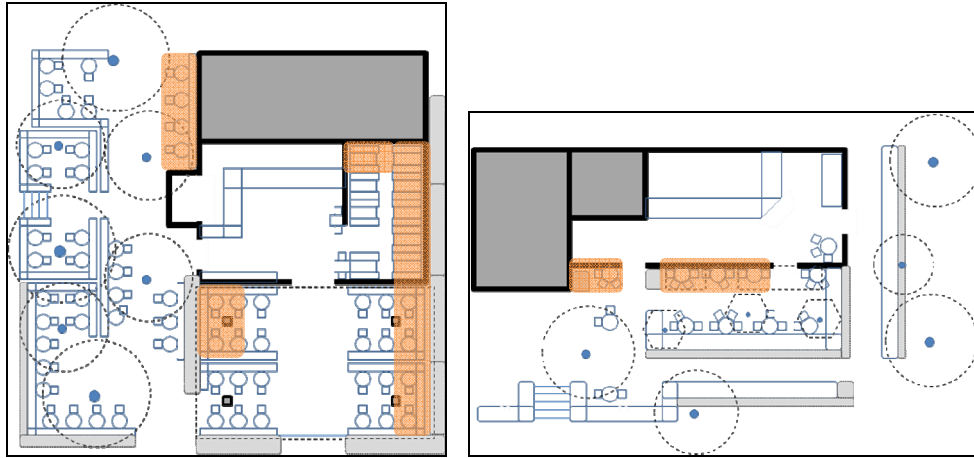


Figure 6-1. Solo users with digital media devices usually sit close to the boundary of Café Strada and Peet's Coffee

2) *The use of digital media is a collective behavior:*

When surrounded by SUwD, almost 70% of users begin to use his own digital media device. The rest move to the other part of the environment or just leave. There are explanations to this phenomenon. The imitators (those who imitate SUwD) adopt their electronic device to fit into the crowd. As surrounded by SUwD, the elements of social pleasure are gone. Users cannot perform interactions or people-watching. Therefore, people act like the surrounding people, in this case, SUwD, to experience some social pleasure. Besides, it is also possible that the imitators enter the environment for the employment of digital media devices. SUwD usually aggregate together close to the boundary of the space. The fact that the imitators choose to place them around SUwD explains their intention. Thus, it is not surprising that they follow SUwD's action and begin to use their own digital media devices.

▪ **People-people activities**

Different types of people-people activities among strangers, such as people-watching, fit into the crowd, and information exchange are covered in Chapter 3. These activities are still commonly found in current public spaces. Participants still like to watch, to act like and to chat with each other. However, since a majority of users enter the public spaces in groups, in my observations, I found people-people activities are not performed between solo users but among groups. A group of two and three has replaced individuals as the basic unit of people-people activities. Also, unlike findings in previous studies, in which individual users in public spaces were identified as a relevant role in social interactions, SUwD in the current public spaces become non-social beings.

1) *A Group of two or three becomes the interaction unit:*

As mentioned in previous section, the majority of users enter public spaces as a group of two or three. They unify together as an entity to interact with other users. When performing cooperative mobility, people act toward the entire group instead of considering them as individuals. For example, when encountering and passing each other on the street, people see another group as a whole. The actions of walking through between them, breaking and separating a group, are never found in my observations.

2) People treat solo users with digital media devices as “non-sociable beings”:

It is not surprising that SUwD play an inactive social role in public spaces. Compared with solo users with physical media (books or newspaper), who is still partly involved in the activities in the physical surrounding, SUwD are regarded as non-sociable beings. The detection of sociable beings relies on the appearance and the activities they act (Biacco and Harm, 2002). Although SUwD have the appearance of sociable beings (as a human), their non-action in the environment diminishes their presence. Group users are not able to exchange civil inattention or cooperate with them. Further, fixing themselves in a non-changing pose, SUwD are neither audience nor actor for people-watching. The interaction pattern is clearly shown in the observation map. Group users rarely face to and gaze upon the directions of SUwD. This phenomenon indicates that SUwD are considered as non-sociable beings and are not expected to participate in people-people activities by group users.

▪ **People-environment activities**

People-environment activities include scene-watching and events participation. The discussion in this section focuses on the extended scene-watching in current public spaces. First, it describes the access to the outside world. Second, the phenomenon that digital media devices become the center of a triangulation is explained.

1) Access to the street:

The seats in Café Strada and Peet’s Coffee have a close relationship with the street (Figure 6-2).



Figure 6-2. The visual access to the street provides extended pleasure from people-watching and scene-viewing. The design of the open space creates mutual visual access between the coffee space and the street. The visual access becomes a feature of extended scene-viewing and people-watching. The spatial boundaries in Café Strada and Peet’s Coffee enable users to easily observe beautiful scenes and unexpected incidents on the street. Store signs, display windows, street decorations during the holiday season, street performance, people with their pet walking by, children laughing are components that add to the visual quality of the environment. Besides, the access to the street enhances the sense of social presence. From the cognitive level of social presence, the continuous motions of pedestrians on the street produce a hint of being together with sociable beings. Their dynamic movements can be identified as a cue of social presence (Biacco and Harm, 2002). Furthermore, the visual access is not only a one-way perception, but also mutually. Pedestrians on the street have visual access to the coffee space as well. The vast number of users and plentiful social life in the successful public spaces pull pedestrians into the environments, and as the result, enrich the environment more.

2) Digital media devices can be a scene:

The role of digital media devices is not completely destructive. They sometimes become a supplementary to scene-watching and stimulate social interactions in the environment. For example, new consumer electronic devices can be a center of a triangulation. The announcement of a new consumer electronic product always creates a buzz around it. People stay up and wait in line to purchase one. Therefore, when the new product appears in public spaces, it attracts attentions and stimulates discussions between strangers.

6.1.3 Place-making

Based on the findings in Café Strada and Peet's Coffee, previous discussions of place-making need to be reconsidered. With the presence of SUwD and their electronic gadgets, elements contributed to functional appropriateness and conceptual appropriateness in current public spaces are listed.

▪ **Functional appropriateness**

As discussed in Chapter 2, affordance and flexibility of physical objects are two substantive items for the achievement of functional appropriateness. They still apply to the design of current public spaces. However, as the numbers of SUwD in public spaces increases, it is necessary to include their activities and their relationship to other users in the discussion of functional appropriateness.

1) Accommodate both group and individual users:

As discussed in Chapter 2, a well-designed public space supports diverse activities from multiple users. In order to accommodate the activities of both group users or SUwD, public spaces now become a compound of the first, the second and the third place⁶.

The environment of Café Strada and Peet's Coffee bears the characters of the third place. The physical appearance of the environment is low profile. The friendly atmosphere and the richness of social interactions demonstrate the appreciation of diversities and individualities inside the spaces. Most importantly, users' smiles show that their mood is always playful. However, Café Strada and Peet's Coffee also feature the sense of the first and the second place depending on who the user is. For group users, the company of acquaintances allows them to bring the private life in the first place to the public. The objects in the environment need to be arranged for group users to enjoy the combination of familiarity (in the first place) and joy (in the third place). On the other hand, for SUwD who telecommute from Café Strada and Peet's Coffee, it is necessary for them to perceive a hint of the second place in the environment, such that they are able to keep their minds in the formal public life.

2) Fixed objects are necessary:

⁶ As Oldenburg defined, a third place is the social environment where informal public life takes place. It separates from home, the first place, and workplace, the second place. The third place fosters civil society, democracy, civil engagement, and most importantly, it establishes sense of place. The characters of the third place include "conversation is the main activity," "accessibility and accommodation," "users are the regulars," "the physical style is a low profile," "the mood is playful," and "a home away from home" (Oldenburg, 1991).

Previous studies have shown that physical objects in public spaces need to be flexible enough to accommodate the diversity of activities. However, in my observations, I found that some fixed elements are necessary in a successful public space. In Café Strada, tables, benches and flowerbeds are attached to the ground. And similarly, bulkheads and tables⁷ in Peet's Coffee are not movable. These fixed elements served two functions.



Figure 6-3. Fixed objects in Café Strada and Peet's Coffee

First, proximity between users is defined by fixed furniture. In Café Strada and Peet's Coffee, furniture position users in each other's social distance. This closer proximity enhances sense of social presence and motivates the interactions that follow. Second, these fixed objects divide the space into smaller sections; but people in different sections are still visually accessible to each other. The division to smaller spaces enables users to partly separate from each other, and enjoy different degrees of public life in the first, the second, and the third place simultaneously. People tend to aggregate with others who are performing similar activities as they do or want. The division of fixed objects geographically separates SUwD and group users from each other. Such that SUwD are able to participate in formal public life while fitting into the crowd; whereas group users can enjoy the company of acquaintance, and, at the same time, enjoy the pleasure of people-watching.

3) Relationship to the outside world:

The access to the street has been discussed in the section of people-environment activities. It is crucial to carefully design the boundaries of a public space as visually accessible to but geographically separated from the outside world. As mentioned, the ability to observe the outside world extends the visual and social pleasure, and enhances social presence. However, a complete open boundary or no boundary does not work either. The boundaries of Café Strada and Peet's Coffee are built with short divisions, such as flowerbeds or bulkheads. This partial division between inside and outside world endows the environments with a sense of secure. Users feel that they are sheltered and protected from the dangers of the street by the physical separation.

▪ **Conceptual appropriateness**

⁷ Tables in Peet's Coffee are not fixed to the ground. But the fact that they are made of metal (therefore heavy) makes it difficult to move them around.

The discussion of conceptual appropriateness focuses on how the form of the environment matches the expectations of users. Substantive items contribute to conceptual appropriateness, such visual pleasure, historical layer, social pleasure and emotional bonds, are covered by Chapter 2. However, given the change of the motivation and activities in current public spaces, it is evident that people now carry different expectations to public spaces. The place-making methods suggested to achieve conceptual appropriateness need to be reconsidered.

1) Create Triangulations

The creation of a triangulation results in both social and visual pleasure. People now expect to participate in public activities as a group with acquaintance. In order to facilitate social interactions among different groups, the form of public spaces now needs to endow with extra stimuli. The creation of triangulations is an efficient and sufficient method. In Peet's Coffee, the stage-like setting allows the street performance or display windows of retail stores to produce a focal point. Users can enjoy the look then chat about it. Also, in this digital era, a billboard with an interesting advertisement located on the street is a possible triangulation element. As shown in Figure 6-4, in Times Square, a big LED screen displaying a motion picture attracts pedestrians' attentions. Then a crowd congregates and casual conversations between strangers are generated.



Figure 6-4. A billboard in public spaces becomes the center of a triangulation
(<http://screenmedia.wordpress.com>)

2) Bring the digital content to the surrounding people

SUwD has been identified as non-social beings. The presence of too many SUwD obstructs social experiences and diminishes sense of place in the environment. Since it is impossible to forbid them to bring and employ digital media devices in public spaces, the solution would be to bring the digital content to the physical world and share with other users. Urban games discussed in Chapter 3 are one of the methods to seamlessly impose digital contents to the physical world. In addition, the portability of handheld digital media devices increases the possibility to facilitate exclusive behaviors, create collective memory and attach meanings to any physical space, even to those without the quality of place. For example, in 2009, when the San Francisco Giants team fought for the World Series championship, a group of my friends went to AT&T Park to watch the game in the field. However, the tickets were sold out. So one of them pulled out his iPad (with a 10" and sharable display) from his backpack and began to watch the game on it just outside of the ballpark. Ten minutes later, they looked back and found that similar to the situation in the radio era when people gathered to listen to a sport game broadcast, a cluster of fans who couldn't get the ticket congregated on the sidewalk,

watching the game on his iPad and discussing the game and cheering for the team together. By sharing digital contents with surrounding people, the collective memory of the game were created and sense of place were later attached to the sidewalk outside of AT&T park.

6.2 The Role of Visibility

After surveying various public spaces, the original hypothesis is partly proved. It is evident that in the same type of computer-mediated public spaces, the visibility to the interaction partners is an important factor that influences users' social experiences and sense of place. The more users are able to observe the surrounding people, the better social experiences and the higher sense of place.

6.2.1 In Copresence Environment

It has been defined in Chapter 5 that in copresence environments, the degree of visibility to the interaction partners is lower than in the observation environments in Step 1. By analyzing quantitative and qualitative data collected in Step 1 and in copresence environments, it is evident that in physical public spaces, the ability to visually perceive interaction partners' actions enhances social experiences and sense of place.

- **The ability to perceive interaction partners' actions through naked sense motivates people to enter the space and enhances social interactions.**

By comparing the average usage rate in observation environments in Step 1 and in copresence environments (Figure 6-5), it is clear that the Step 1 attracts more people than copresence environment. The average usage rate per table and occupancy rate in Café Strada and Peet's Coffee are significantly higher than in Philz Coffee and Berkeley Espresso.

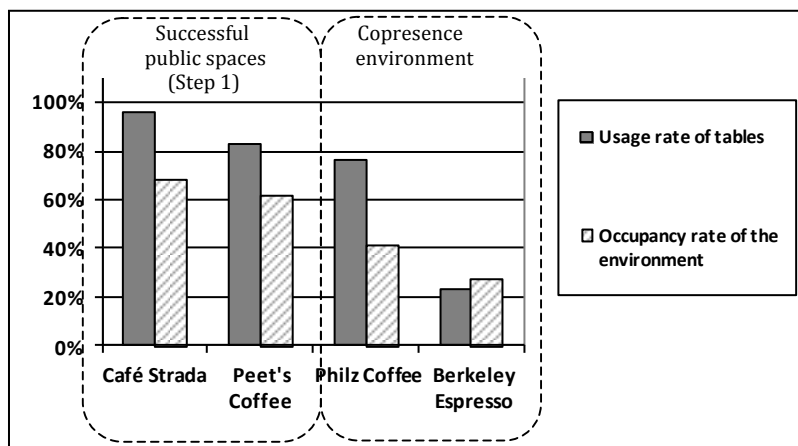


Figure 6-5 The average usage rate of copresence environments and observation environments in Step 1. The average usage rate per table is almost 96% in Café Strada and 83% in Peet's coffee, whereas it is 76% and only 23% in Philz Coffee and Berkeley Espresso; similarly, the occupancy rate of the space is 68% and 62% in Café Strada and Peet's Coffee, whereas the number is down to 42% and 27% in Philz Coffee and Berkeley Espresso. The numeric differences indicates that people are motivated to enter and stay in the public spaces, similar to Café Strada and Peet's Coffee, where they are able to directly observe the interaction partners with bodily senses. The

environments in which users' actions are hidden behind the digital media devices, like Philz Coffee and Berkeley Espresso, bear fewer features to attract participants to enter.

Other than the quantitative indication, the role of visibility is also shown through the intensity of social interactions. First, participants in Café Strada and Peet's Coffee perform interactions for social pleasure. In my observations, various types of social interactions along with happy facial expressions occur. People smile to each other and casual conversations are welcomed. On the contrary, in Philz Coffee and Berkeley Espresso, people interact with each other because of functional reasons. Oftentimes, their body movements and interactions are followed by the action that one of the users moves to the restroom or requests to plug-in his digital media device.

Second, people maintain a closer proximity in successful public spaces than in copresence environments. The average distance among users in Café Strada and Peet's Coffee is 5', which fall into the category of social space; whereas in Philz Coffee and Berkeley Espresso, people stay on average 16' apart, in which only public interactions are allowed. This distance difference indicates whether users are willing to perform social interactions. When participants keep a larger proximity from each other, they intend to avoid contact with each other. In addition, as the success of social presence depends on the close proximity, this larger proximity decreases social presence. Users are unable to detect each other's motions and cues when they are thus far away from each other.

Finally, in my observations, I found that people tend to avoid eye contact with each other in copresence environments. As majority of users in copresence environment are SUwD, it is not surprising that they are immersed with virtual content and do not want to be interrupted.

▪ **The ability to see the interaction partners enhances sense of place**

Comparing the interview results in different physical public spaces, it is evident that observation environments in Step 1 are equipped with sense of place. According to interviews with ten to twelve participants in each space, it appears that many users in Café Strada and Peet's Coffee enter the space because of personal attachment to the environment; whereas participants go to Philz Coffee and Berkeley Espresso for functional reasons. In my interviews in Café Strada, participant mentioned that *"the reason I am here? Isn't it obvious that this space is full of power. And I love it"*; *"I went to Cal ten years ago, and this was always my favorite spot. I have so many pleasant memories here. I am visiting my niece and it's the first place I want to see"*; *"being here almost every Tuesday for a relaxed afternoon. Love the trees and air."* For Peet's Coffee, users stated that *"the coffee is just delicious"*; *"it is the best place in 4th street. I can see interesting things happening"*. These descriptions demonstrate how much users adore the spaces, and attach meanings and emotional bonds to them. On the other hand, participants in Philz Coffee and Berkeley Espresso entered the the spaces because *"They provide free wi-fi"*; *"It's close to my office"*; *"I got off BART too early. Got time to kill"*; *"This place is on my way to a meeting"*. These answers explain the users' goals and intentions in copresence environments. It is obvious that they go to copresence environments not because of the qualities of the space, but the convenience.

▪ **People go to copresence environment for the use of digital media devices**

Unlike users in public places who seek for visual and social pleasure, users in copresence environments enter the space because they intend to use digital media devices. According to the interviews, users in Philz Coffee and Berkeley Espresso reported that they chose the space because of “free wi-fi”; “some empty seats and free wi-fi”; “I yelled it and found it’s the nearest free wi-fi spot”. The repeated mentions of wi-fi access indicates their goals to enter copresence environments was simple, to employ digital media devices.

Oftentimes, people use digital media devices in public spaces for telecommuting. They work from a local coffee shop instead of the office. In this sense, a local coffee shop becomes the second place with hyperlinks. It is now a workplace where people participate in the formal public life. However, although a local coffee shop has transformed into a more formal public space, with hyperlinks in digital media devices, users can jump back and forth in different virtual sites to enjoy virtual social pleasure.

6.2.2 In Tele-copresence Environments

Chapter 5 describes sites selected as the observation target in this research. Although they all fall into the category of tele-copresence environments, the degrees of visibility to the interaction partners vary in them. Based on the result of the experiment, the role of visibility is conspicuous. It is evident that in tele-copresence environments, the ability to double-perceive the interaction partners in both the virtual and physical world enhances sense of place and facilitates social experiences.

▪ **The ability to see interaction partners in the physical world enhances the sense of place**

The survey result of Setting A demonstrates the role of visibility in tele-copresence environments (Figure 6-6). The ability to perceive the interaction partners in the physical space endows the environment with sense of place. According to the survey, sense of place in Setting A originated from the physical context and the control factor. A greater proportions of the Wii remote users agreed that they learned something after visiting this demo. They were looking forward to coming back in the future. Furthermore, they commented on this project as “*Fascinating!*” and “*Very Creative*”. For most users, the environment is indeed equipped with the quality of place, which leads to meanings, memories and emotional attachments.

On one hand, sense of place is formed through the physical context of the demo. The physical environment, especially the big screens with the virtual environment projected on them, provides visitors with memories and meanings. Almost all users agreed that they learned something and attached meanings to the space because of the physical setting. Comparing the experiences in the physical and virtual world, the majority of Wii remote users agreed that they learned more from the physical setting than from the virtual world. Furthermore, for non-Wii remote users (observers), the meanings of the physical setting is significantly stronger than the virtual world (Figure 6-7). Since the non-Wii remote users could not directly experience the virtual world, they paid more attentions to the physical setting. Almost all non-Wii remote agreed that they learned something from the physical setting as well as attached meanings to it.

On the other hand, the experience of intuitive control increases sense of place. The Wii remote users agreed that the experience of highly corresponsive interface makes the environment

more meaningful. However, the non-Wii remote users' responses are more conservative. They selected "uncertain" rather than an affirmative opinion. According to their comments, this is because non-Wii remote users' impression on the space was based on the observations on the Wii remote users. One of the non-Wii remote user commented his experience as *"My experience was very brief, and so my feedback is not very deep."*

▪ **The ability to see interaction partners in the physical setting facilitates social experiences**

The survey result in Setting A reinforced the role of visibility in social experiences (Figure 6-6). By cross examining visitors' responses to the setting of physical world and virtual world, the ability to see other users in the physical environment enhances sense of social presence in cognitive, psychological and behavioral level.

First, participants agreed that the setting provides a mutual sense of watching and being watched. Almost all users agreed that they were able to observe actions of others in the physical setting. They also agree that they experienced the company of other users in both virtual and physical world.

Second, at psychological level, the experience in Setting A was endowed with involvement and affective awareness. Participants were engaged deeply in the interactions. They agreed that their actions were indeed influenced by the surrounding. However, the sense of influence was not mutual. Many users were uncertain about *"I felt that my presence influenced other visitors"*. Based on the comments, more interactions in the virtual world might increase users' awareness of mutual influence. They commented on the environment as *"More interactions with other ppl, like conversation box for the West Oakland history,"* and *"Be able to engage with other visitors, by dancing and conversing."* Also, the existence of other users in the physical world provides emotional attachments and meanings. According to the survey result, users agreed that they would miss it if they could not observe other users in the physical setting. They also agreed that other users help them learn about West Oakland.

Finally, in terms of the behavioral level, the use of an intuitive input device improves social experiences. With the use of Wii remote, an interface which highly corresponds to users' bodily movements, a high proportion of users agreed that they were able to easily control their own avatar and response to the social environment. However, they still expect more. According to the comments, they still expect *"better and smoother control"* and *"make it easier to move from side to side."*

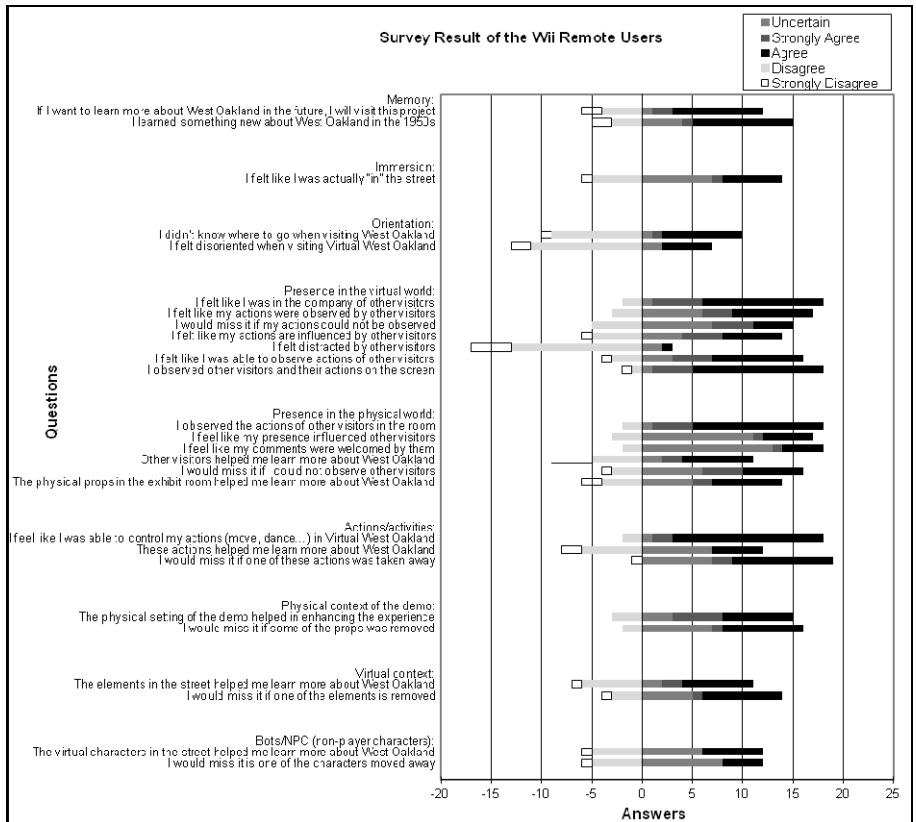


Figure 6-6. Survey result of the Wii Remote user in Setting A

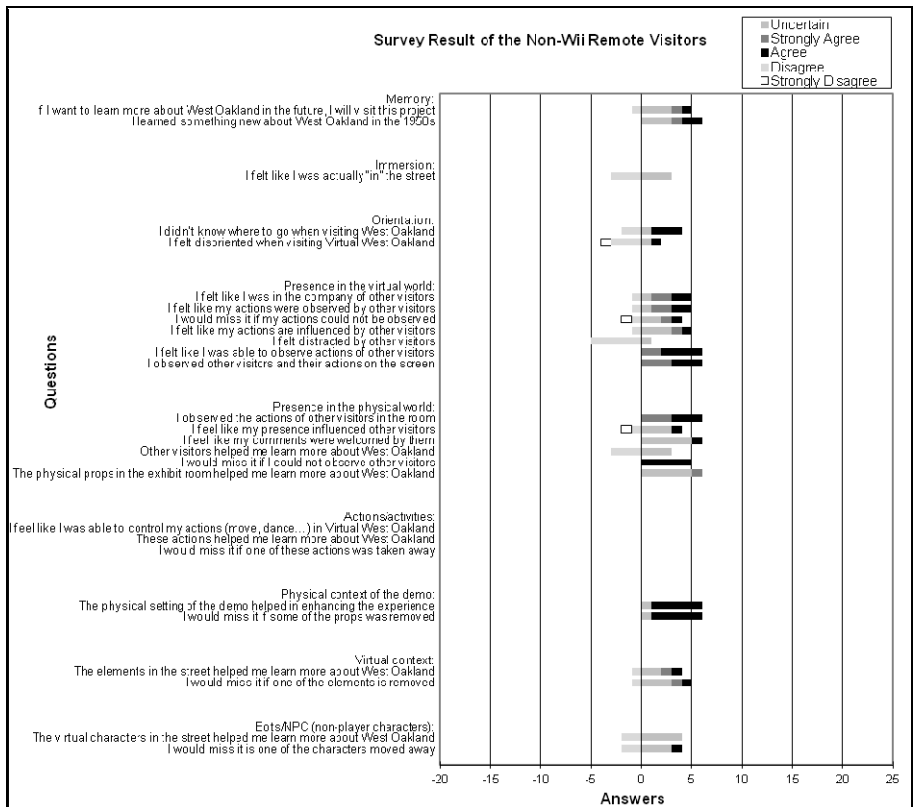


Figure 6-7. Survey result of the non-Wii Remote users in Setting A

- **A holistic view of the environment enhances sense of place**

Surprisingly, a holistic view plays a significant role in enhancing sense of place in public spaces. It is a substitution for visibility. According to the survey result, as most users felt disorientated in Setting A, they expected a holistic view. Their comments on the virtual environment such as *“need the ability to take a helicopter ride before landing on the street”* and *“giving more context reference”*, indicate that they need to grasp a general understanding of the environment about where to go before actually visiting it. In this sense, a holistic view generates the recognition of the environment. It provides sense of orientation and place identity, and as the result increases the sense of place.

- **When users are unable to perceive each other’s actions from their body movements, the interactions among them become task-orientated**

Users in Setting B, C and D were not able to perceive each other’s action from the body movements, but from the display of the digital media device. In these situations, their interactions are not for social pleasure but become task-orientated. According to the descriptive behavioral notations in these settings, almost all interactions are related to the performance in the virtual world. A majority of conversations are related to how to manipulate the avatar in the virtual world, such as *“press A”*; *“lift your thumb from the stick”*; *“press the left trigger”*. Some are reminders of the danger in the virtual world. For example, *“watch out”*; *“the monster is coming”*; *“shoot! Shoot!”*

Although only one or two players were using the controller to manipulate the avatar, the observers share the same emotions with the player. It is commonly found in my observations that when the player with the controller completed or were unable to finish the assigned task, such as killing the monster or winning a sport game, the observers empathize with the players’ feelings. The players and the observers smiled, cheered and yelled together. Also, when unexpectedness occurred in the virtual world, users, including players and observers, screamed or laughed together. For example, when players surprisingly ran into a turkey in the game and said *“haha! What’s that? Can I shoot it?”* the observer laughed with him without hesitation.

- **Digital media devices sometimes create the centripetal effect upon social experiences in physical public spaces**

As discussed, digital media devices sometimes produce positive effect in physical public spaces. This is also true in tele-copresence environments. Based on my observations, when the display device is sharable among a group of people, the digital media device produces a centripetal effect upon public spaces. As shown in Figure 6-8, the display monitor becomes a source of both social and visual pleasure. On one hand, it is the visual center of amusing and unexpected content. The combination of the game environment itself along with the performance of the players displaying in the monitor becomes great entertainment. Players who are unable to accurately control their avatars usually make funny and sometimes foolish movements. They are transformed as the target of scene-watching. On the other hand, since the display of the digital media device is so entertaining, it actively pulls people together and stimulates casual conversations as other triangulations in public spaces.



Figure 6-8. Digital media devices sometimes play the centripetal role in public spaces

6.2.3 In Telepresence Environments

The visibility to the interaction partners also plays a significant role in social experiences in telepresence environments. As discussed in Chapter 4, users in telepresence environments employ text to communicate with each other. In this sense, they identify each other as a sociable being and understand each other through reading text, including text that describes users' personal information and the actual content that is used to interact. From my observation, greater amount of details regarding user personality and identity lead to better social experiences. Furthermore, the actual content does not affect social experiences.

- **More details of users' personality and identity facilitate social experiences**

It is found that the user with the screen name, a profile image and a hyperlink to personal profiles received significantly more replies and recommendations than other users (Figure 6-9). The average replies users receiving is 22, 16, 7 and 2 for Group A (users with screen name, profile image and personal profile), Group B (users with screen name and profile image), group C (users with screen name only) and Group D (anonymous users) correspondingly. Also, the average number of recommendations for users of Group A, Group B, Group C and Group D are 46, 23, 8 and 3 correspondingly. The numeric difference indicates that with more details on personality and identity, the better social experiences.

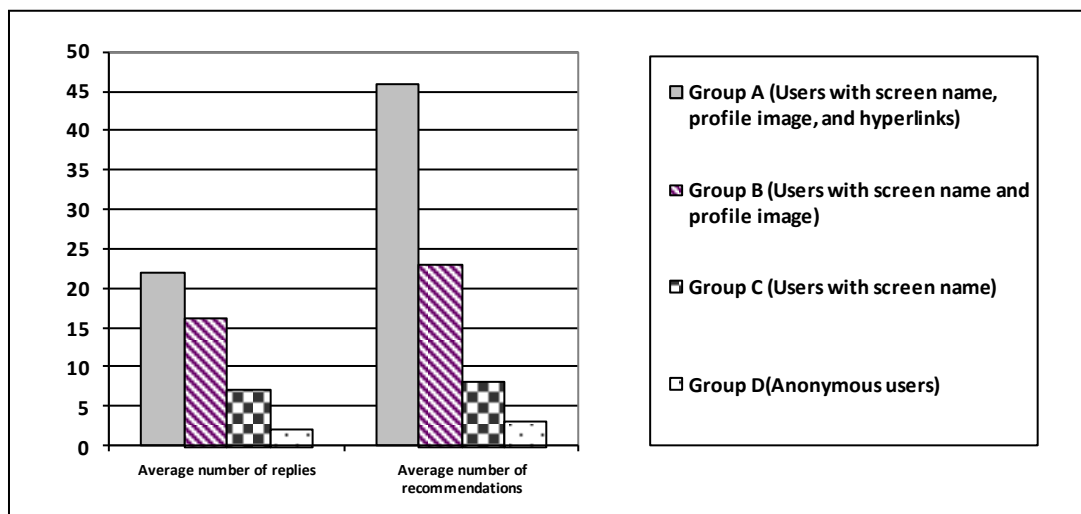


Figure 6-9. The average numbers of replies in tele-presence environment

Screen name, profile image and personal profile become substitute for appearance cues to guide people in responses. In telepresence environments, users employ screen name, profile image, and personal profile to present themselves. By reading the information, users are able to imagine the look of the interaction partner and recognize the goal and the next movement of him, then respond correctly. If the user is willing to share more personal information, interactions with him become smoother. People feel comfortable and effortless to interact with users who share more personal information.

In addition, anonymous users are identified as non-social beings. Their post usually produces less sense of social presence. From my observations, anonymous users received limited to zero replies and recommendations. As discussed in Chapter 3, in virtual environments, sense of social presence is originated in the existence of other social beings. However, without screen name, profile image and personal profile displayed, people are unable to detect the appearance cues from anonymous users. From the cognitive level of social presence, anonymous users are identified as non-social beings. Their presence is unrecognizable. As a result, people do not reply or recommend anonymous users' comments.

- **Whether the content of the comment includes hyperlinks, quotations or citations does not affect social experiences**

The actual content of the interactions is also included in the data collection process. It was assumed that comments with outside sources received more replies and recommendations because they seem more convincing. However, after the cross comparison, the actual content with or without outside source does not produce the effect upon social experiences. The average numbers of replies and recommendations are not significantly different no matter how much outside source, hyperlinks, quotations or citations, a comment includes.

6.2.4 Cross Comparison among Different Types of Computer-mediated Public Spaces

As discussed in the previous sections, the visibility to the interaction partners plays a significance role in social experiences in the same type of computer-mediated public spaces. However, I was unable to cross compare social experiences in different types of computer-mediated public spaces. I found that visibility is not the only factor that affects social experiences in these environments. The understanding of social experiences in copresence, tele-copresence and telepresence environments is a more complex process.

6.3 Analysis Scheme

Each type of computer-mediated public spaces exists with its own potentials and problems. The activities and interactions users are able to perform in the three types of computer-mediated public spaces vary. Users choose to participate in activities in copresence, tele-copresence and telepresence environments based on their goals and intentions. Therefore, the discussion of social experiences in computer-mediated public spaces cannot limit to visibility and need to expand.

Given the discussion in literature review and the observations, a four-dimension scheme, including functional appropriateness, conceptual appropriateness, perceptual appropriateness and behavioral appropriateness, is introduced to analyze computer-mediated public spaces.

Functional appropriateness and conceptual appropriateness deal with the object and the form of the environment. Perceptual appropriateness and behavioral appropriateness are used to measure social experiences in the environment. Each dimension contains several substantive items as listed in Table 6-1.

Dimension	Substantive Item
Functional Appropriateness	
Affordance	Support individual and group activities; Compound of 1 st , 2 nd and 3 rd place
Accommodation to special events	Flexible enough to host special event; yet has some fixed objects
Accessibility	Equal access to everyone; open during a specific time period and at a specific geographical location
Relationship to outside world	Visually accessible but geographically separated to the outside world
Conceptual Appropriateness	
Social pleasure	From strangers (categoric-knowing persons) and acquaintances (coming as group); Creation of triangulations and share digital contents
Visual pleasure	Visual complexity that provides the place identity
Historical layers	Symbols that associate with memory
Interpretation of symbols	Automatically triggered; Store in the memory
Emotional bonds	Provide joy, unexpectedness and sense of security
Perceptual Appropriateness	
Visibility	Wide range of vision; zoom-in to see details
Proximity	In close proximity; perceived each other with naked senses
Reference cues (presentation form)	Pick up appearance, behavioral and spatial cues
Interpretation of reference cues	Unconsciously use categorized knowledge
Response time	Real-time
Behavioral Appropriateness	
Presentation of self	Apply reference cues
Control of viewpoint	Spontaneously change the viewpoint
Control of action/reaction	Automatically employ the embodied language

Table 6-1. The four-dimension analysis scheme

6.3.1 Functional Appropriateness

In order to achieve functional appropriateness, the design of computer-mediated public spaces needs to consider the issues of 1) affordance, 2) accommodation to special events, 3) accessibility, and 4) the relationship to the outside world.

As discussed in Chapter 2, affordance and flexibility are two major elements in the achievement of functional appropriateness. The arrangement of objects in public spaces should support the diversity of activities for multiple users. The environment needs to provide the quality of the first, the second and the third place for users to enjoy different kinds of public life. Also, it should be flexible enough to accommodate special events. Yet, observations in Step 1 gave a twist in this. In current public spaces, some fixed objects are necessary. These fixed objects impose a closer proximity among users, while they divide the environment into small divisions. In this sense, people are separated from others who are performing different activities, and yet, perceive social presence.

Accessibility is another issue when discussing functional appropriateness in computer-mediated public spaces. It has been discussed that a public space is an area that is equally open to everyone. The nature of public spaces grounds a spatiotemporal restraint on the access to public spaces. In order to participate in activities in a physical public space, people need to

physically move to one geographical location during a specific period of time. However, as digital media develops, new concept regarding public spaces surfaces. On one hand, it is possible that the location of a public space is fluid. People are able to participate in activities in the virtual space while physically located in all corners of the world. The spatiotemporal restraint disappears. On the other hand, a part of the public space might only open to particular users. Virtual sites are all privately maintained. Some of them provide privileged access to VIPs. Users who paid extra for service are able to access more information or are allowed to act differently in the site. For example, players of PSP Golf can purchase a special package, such that their avatars are equipped with better golf clubs and allowed to play in more virtual golf courses. The different treatment to general population and VIPs changes our concept about public spaces.

The relationship to the outside world is discussed with the findings in Step 1 observations. Boundaries between a public space and the outside world need to be geographically separated but visually accessible to each other. The visual access to the outside world satisfies users' goal of people-watching and scene-viewing; whereas the geographically division endows the environment with a sense of security.

6.3.2 Conceptual Appropriateness

The discussion of conceptual appropriateness in computer-mediated public spaces covers five directions -- 1) social pleasure, 2) visual pleasure, 3) historical layers, 4) interpretation of symbols, and 5) emotional bonds.

It has been discussed in Chapter 2, that a successful public space needs to satisfy users' expectation of social pleasure, visual pleasure, memories and emotional bonds. The form of a well-designed public space is usually complex but understandable. This has not changed significantly in current public space design. However, some items need to be added to the list when analyzing social experiences in different types of computer-mediated public spaces.

First, according to the observations in Step 1, most users enter public spaces as a group. The source of social pleasure does not only originate from strangers but also from acquaintances. In this sense, it becomes difficult to switch attentions from acquaintances to the surrounding strangers. Furthermore, it is evident that digital media devices have become a powerful tool to produce social pleasure. By transforming personal digital media devices as a center of a triangulation, it becomes an extra stimulus to pull groups together and stimulate social conversations among strangers.

Second, the interpretation of symbols is another metric to measure conceptual appropriateness in computer-mediated public spaces. As mentioned, the historical layer plays a significant role in connecting people to the environment. In physical public spaces, it is an automatic process for users to understand the meanings of a symbol and then memories are triggered. However, in computer-mediated public space when the environment is represented in different forms from the physical world, e.g. text or animation, the process of finding and understanding symbols of historical layer is more complex and might hinder the sense of place. Therefore, it is important to include the process of interpreting symbols in the analysis of computer-mediated public spaces.

6.3.3 Perceptual Appropriateness

Perceptual appropriateness deals with the factors relating to the sense of social presence. The elements that contribute to perceptual appropriateness include 1) visibility, 2) proximity, 3) reference cues (presentation form), 4) interpretation of reference cues, and 5) response time. It has been discussed in Chapter 3 that a successful social presence is derived from close proximity, the appearance of the interaction partners, the activities they perform, and the response time. The substantive elements for perceptual appropriateness are listed to reflect these factors.

Different computer-mediated public spaces are furnished with different means to display the environment; hence the degrees of visibility vary. As discussed, visibility is a significant factor in social presence. Social presence occurs when users are able to detect and identify the existence of other sociable beings. In natural environment, the wide range of vision to the entire environment enables people to detect the presence of other people. The ability to zoom-in to details allows us to identify others as sociable beings. Therefore, a well-design computer-mediated public space is equipped with better visibility. It should allow users to simultaneously observe the entire environment and to zoom-in to pick up useful reference cues.

In order to produce social presence in traditional public spaces, users need to stay in close proximity and used naked sense to detect reference cues from the surrounding people. However, in computer-mediated public spaces, particularly in tele-copresence and telepresence environments, people are located separated. It is impossible to stay in close proximity. Each environment provides a substitution for physical proximity. The efficiency of these substitutions needs to include in the measurement of perceptual appropriateness in computer-mediated public spaces.

As discussed in the previous section, a recognizable presentation form of other user leads to better sense of social presence. If the presentation form of other user provides appearance, behavioral and spatial cues, people are able to recognize them as sociable beings, then the interactions can occur. Yet, keep in mind that in computer-mediated public spaces, users are usually not presented in the form of human. The coding/decoding system we have developed throughout the entire life collapsed. It is possible that the decoding of reference cues in computer-mediated public spaces is out of our categorized knowledge and requires extra learning and conceptualizing process.

Finally, it has been discussed in Chapter 3 that a faster response time leads to a better sense of social presence. From the psychological level of social presence, the quicker response from the interaction partners indicates a deeper engagement and they are interested in the following interactions. In order to improve social presence, it is ideal if the response time is real-time.

6.3.4 Behavioral Appropriateness

The behavioral appropriateness discussed the control of movements in computer-mediated public spaces. Based on the survey in the experiment, it is evident that the intuitive control of behaviors in Setting A enhances social presence and attaches sense of place to the environment. Given the literature review and observation results, the achievement of

behavioral appropriateness needs to discuss 1) presentation of self, 2) control of viewpoint, and 3) control of reaction.

First, in order to receive expected response, users need to be able to control the presentation of self. It has been discussed in Chapter 3 that people apply reference cues to themselves for the purpose of receiving intended response. In computer-mediated public spaces, people are represented in digital forms, text or avatar. The system and interface controls how and what users can do to change the appearance in the virtual world. Sometimes, people find it difficult to exhibit them in the virtual site, and as a result, cannot receive intended response. The social experience then lowers. In this sense, the ability to easily transform our appearance becomes important to achieve behavioral appropriateness.

Second, the control of viewpoint plays significant role in facilitating social interactions. As discussed in Chapter 3, the ability to change viewpoint help people perceive the world and present themselves. By switching viewpoint, people are able to obtain more environmental information. By change the direction of viewpoint, we are able to display our goals and intentions. Without the control of viewpoint, people lose the ability to sense social presence and perform social interactions. Therefore, it is inevitable to include the control of viewpoint to the discussion of behavioral appropriateness.

Finally, the control of action and reaction affects social interactions. Different computer-mediated public spaces are equipped with different methods to control actions and reactions. Based on the survey results, a better and smoother control will enhance the experience. It seems that users are looking for a highly responsive interface with which they are able to automatically employ the embodied movements to perform interactions.

6.4 Analysis of Computer-Mediated Public Spaces

By applying the analysis scheme to the observation environments, it is clear that each type of computer-mediated public spaces has its design problems and social potentials.

6.4.1 Copresence Environments

After evaluating social experiences and sense of place in copresence environments with the analysis scheme (Table 6-2), it is obvious that the environment allows better perception and is equipped an easy control. As users are bodily co-located in copresence environment, it is not surprising that they are able to sense and interact with each other through the physical body. However, the nature of copresence environments weakens the achievement of functional and conceptual appropriateness. The arrangement of physical objects in copresence environments does not support multiple activities. In addition, the forms of current copresence environments do not fit users' expectations. People are unable to enjoy social and visual pleasure, ignore the historical layer, and do not attach meanings to the environment.

Dimension	Situation	Achieved?
Functional Appropriateness		
Accessibility	Time and location restraints	N
Affordance	2 nd place with hyperlinks; support digital media device users; lack for fixed furniture	N
Accommodation to special events	No special event happens	N
Relationship to outside world	Limited or none	N

Conceptual Appropriateness		
Social pleasure	Declining social pleasure from strangers	N
Visual pleasure	People don't pay attention to the physical environment	N
Historical layers	People don't pay attention to the physical environment	N
Interpretation of symbols	People don't pay attention to the physical environment	N
Emotional bonds	Functional attachment only	N
Perceptual Appropriateness		
Visibility	Wide range of vision; zoom in to details	Y
Proximity	Public distance or larger	N
Reference cues (presentation form)	Human but hidden behind the display of digital media devices	N
Interpretation of reference cues	Automatic	Y
Response time	Real-time	Y
Behavioral Appropriateness		
Presentation of self	Apply reference cues	Y
Control of viewpoint	Spontaneously	Y
Control of action/reaction	Embodied language	Y

Table 6-2. The potentials and problems in copresence environments (applying the analysis scheme)

▪ **Functional appropriateness**

The achievement of functional appropriateness in copresence environments is weak. First, the accessibility in copresence environment is restrained. There are time and location limitations for entering the space. As discussed, people enter copresence environments for the intention of using digital media devices. It is necessary to provide Internet access. To fulfill the requirement, the environment is usually privately owned, such as a coffee place or a shopping mall. To participate in activities in copresence, users are required to be physically present in a geographical location during the business hour of the space.

Second, the affordance in copresence environment is limited. Both physical and social settings in copresence environments support only minimum activities. The lack of fixed furniture in copresence environments hinders the diversity of users and activities. In addition, copresence environments are considered as the second place with hyperlinks. The atmosphere of the space seems formal and the diversities of users and activities are little.

Third, the low capacity of special event in copresence environments obstructs the achievement of functional appropriateness. Although the furniture is flexible in copresence environment, there is no special event taking place. From my observations, no furniture in Philz Coffee and Berkeley Espresso is fixed to the wall or the ground. But meanwhile, during the total of twenty-four-hour visit in each copresence environment, I did not witness any special events happening. I did not find any flyers that promote special events held in these two coffee shops.

Finally, the relationship to the outside world is insufficient in copresence environments. The main seating area in Philz Coffee and Berkeley Espresso and the street is disconnected. Although there are outside seating in Philz Coffee and Berkeley Espresso, almost no participant intends to stay there (Figure 6-10). Users are not able to visually access to the outside world and enjoy extra social and visual pleasure.



Figure 6-10. The outside seating in Philz Coffee and Berkeley Espresso

- **Conceptual appropriateness**

Conceptual appropriateness is also weak in copresence environments. It seems that the form of copresence environment does not fit users' expectations. As a result, users are not able to enjoy social and visual pleasure, identify historical symbols and attach emotional bonds to the environments. This is fundamentally originated from users' neglect of the physical surrounding.

Users in copresence environments pay majority of their attention to the digital media devices and ignore the spatial qualities in the physical world. Users' behavioral pattern in Philz Coffee and Berkeley Espresso is straightforward. After entering the space, they work on the digital media devices without watching people, viewing the scene or interacting with others. In this sense, the physical environment does not provide any components of excitement. As a result, there are no emotional attachments to the space.

- **Perceptual appropriateness and behavioral appropriateness**

Social presence and interactions are experienced through body in copresence environments as in traditional public spaces. The process of perception and control of behaviors is automatic and spontaneous. The overall social experience should be adequate. However, social presence is difficult to produce in copresence. On one hand, the sense of social presence is hindered by the distant proximity. As mentioned, users keep a social distance in successful public spaces (the observation environments in Step 1), whereas they keep a public distance in the copresence environments (Philz Coffee and Berkeley Espresso). As a result, users in copresence environments experience difficulty observing the existence of others. On the other hand, the usage of digital media devices conceals social cues from other users. In copresence environment, instead of acting toward the physical setting, users perform activities in the virtual environment with digital media devices. The surrounding people in the physical world are unable to detect behavioral cues and decode goals and next movements from their actions. In this sense, they are considered as non-social beings, and social presence of the environment declines.

6.4.2 Tele-copresence Environments

The tele-copresence environment is a more complex environment (Table 6-3). In general, the mediated perception and interactions lead to the difficulties in achieving perceptual and behavioral appropriateness. Since everything in tele-copresence environments is represented through animation, the symbolized representation of the environment and users hinders social experiences. However, the experiences in tele-copresence environments create a sense of

place. Users in tele-copresence environments attach emotional bonds to the environments because of the flexible access, the exclusive behavior, unexpected visual pleasure and worldwide social pleasure from strangers.

Dimension	Situation	Achieved?
Functional Appropriateness		
Accessibility	Privileged access; anytime; everywhere	Y
Affordance	Specified activity- finish assigned task; 3 rd place at home	Y
Accommodation to special events	Virtual objects; controlled by the service provider	N
Relationship to outside world	None	N
Conceptual Appropriateness		
Social pleasure	Worldwide social pleasure from strangers	Y
Visual pleasure	Unexpectedness; need more details (textual rendering)	Y
Historical layers	Symbolized world	N
Interpretation of symbols	Sometimes falsely paired	N
Emotional bonds	Joy and excitements	Y
Perceptual Appropriateness		
Visibility	Limited by the screen; lack for orientation; difficult to zoom in	N
Proximity	Virtual proximity	N
Reference cues (presentation form)	Avatar designed by the game company	N
Interpretation of reference cues	Conceptualized; sometimes falsely paired; no categorized-knowing to guide behavior	N
Response time	Real-time	Y
Behavioral Appropriateness		
Presentation of self	Avatar	N
Control of viewpoint	Through the interface	N
Control of action/reaction	Mediated actions (limited by the game environment)	N

Table 6-3. The potentials and problems in tele-copresence environments (applying the analysis scheme)

▪ **Functional appropriateness**

The design of current tele-copresence environments achieves functional appropriateness through accessibility and affordance. On one hand, the environment provides a flexible access in which users are able to participate in activities without time and location restraints. The Internet connects users. It is possible for them to enter tele-copresence environments while physically located anywhere. Secondly, although the environment does not support a diversity of activities, it provides a great platform for a single activity. People sign up for popular multi-user games to work as a team and finish the assigned task. By participating in group activities, users are able to enjoy multiple people-people activities, such as interactions and fit-into-crowd. The intended activities are fully supported by the environments. Furthermore, tele-copresence environments bear features of the third place. Users in the tele-copresence are regulars and the mood is usually playful. Users playing Xbox Halo are usually regular users. Almost all of them have more than 1,000 hours of experience playing the game. Most users' last login was less than 24 hours. Besides, although their conversations are task-oriented, their mood is cheerful. Emotional expressions such as "haha!", "Yes!Yes!Yes!", and "hohoho" are commonly found in the descriptive behavioral notation in Setting D. Several users even began to sing happy songs after completing the task.

On the downside, the arrangement of objects in tele-copresence environments lacks accommodation to special events and the connection to the outside world. First, since tele-copresence environments are usually privately owned and maintained by the game companies,

special events are controlled by the creator of the game environment. If the owner does not promote their product through virtual events, the flexibility element of place-making in the environment is gone. In my observations, I did not witness any special events occurring in tele-copresence environments⁸. Further, the environment does not provide a relationship to the outside world. The lack of the connection to the outside world limits the possibility of social and visual pleasure. It is impossible for users to perform the activities of people-watching and scene-viewing.

▪ **Conceptual appropriateness**

Although the form of tele-copresence environment lacks historical layers and understandable symbols, it provides social and visual pleasure and the experience creates emotional bonds to the environments. The form of tele-copresence environment is made of animation, a simulation of the real world. It is impossible to fully represent everything in the physical world. Creators just pick up phenomenal objects that they thought recognizable. In this case, the creator might choose wrong symbols to deliver behavioral hint. It is commonly found in my observations that users of tele-copresence yelled “*now what?*”, “*what’s that green thing?*”, “*should I move?*” and “*does the arrow mean I can open the box?*”. These symbols confuse users and, when inaccurately interpreted, lead to the decline of sense of place.

Yet, users still enjoy social and visual pleasure and attach emotional bonds to the tele-copresence environments. First, users in tele-copresence environments are connected by Internet, where is no spatial limitation. Users are able to contact strangers from every corner of the world. The interactions with people from different cultures add to the social pleasure. Second, as the environment is made of animations, creator can install unexpected objects in the space; for example, a turkey in a battlefield or a bottle of coke in the desert. The existence of these objects conflicts with our experience in real life and creates a sense of excitement. As the result, users associate a place attachment to the environment. However, users still expect more details and variations to improve the sense of immersion. According to the comments in the survey in Setting A, users want “*More detail*”, “*Create a bit more texture to the club’s wall*”, “*Add more elements to the street space*” and “*add a bit more variations on the fashion aspect-to enhance the fashion of the era by implementing colors and unique touches of the era*”.

▪ **Perceptual appropriateness and behavioral appropriateness**

The fundamental problem in perceptual and behavioral appropriateness in tele-copresence environment rooted in the interface. Although the users are represented as a graphical representation of sociable beings and the response in the real-time, the perceptual appropriateness in the tele-copresence environments is still weak. The human-looking avatar definitely conveys a sense of sociable being. However, the limited visibility has hindered the maintenance of social presence. It has discussed in Chapter 3 that the sense of social presence is maintained because of the receipt of dynamic movements of other participations. Since the vision range has been restricted by the output device of the interface (and usually only the

⁸ However, I am aware that there are virtual events held in other tele-copresence sites other than the observation environments selected in this research. For example, in SecondLife, users are able to gather together for a half-day informal event. The service provider creates elements, such as music and virtual fireworks, to celebrate the event.

actions of the user himself are displayed in the output device), the users have no ability to constantly check the current status of other participants.

In terms of visual cues, the human-looking avatar and synthetic body gesture of other participants have indicated certain apperential and behavioral cues. But the spatial cues are still missing. The spatial scale in the screen is different from the physical world (Anders, 1998). The user cannot evaluate the territories of other participants and the distance between him and them.

Further, in terms of action control, users respond to other participants by working with the interface. The innate body movement of the user in the avatar-animation virtual public space will not evoke users' previous experience in the physical spaces. The user has to explicitly and consciously instruct the avatar to express the intended actions and reactions. This may hinder social interaction. According to users comments on Setting A, they still expect "*more realistic experiences*".

6.4.3 Telepresence Environments

When analyzing social experiences in telepresence environment, it is obvious that perceptual and behavioral appropriateness are weak. As the space is constructed by verbal elements, social experiences are highly dependent on the understanding of a specific language. In the case of the experiment, users need to understand English in order to perform social interactions. However, telepresence environments is endowed with the quality of place. Since the participation of telepresence has no spatial-temporal restraint, telepresence environments become substitutional places to enjoy worldwide social pleasure anywhere, anytime.

Dimension	Situation	Achieved?
Functional Appropriateness		
Accessibility	Privately maintained; Anytime/everywhere	Y
Affordance	Specified activity- information exchange; 3 rd place at home	Y
Accommodation to special events	No special event in one site; connect with hyperlinks	Y
Relationship to outside world	Hyperlinks	Y
Conceptual Appropriateness		
Social pleasure	Worldwide social pleasure from strangers	Y
Visual pleasure	No visual pleasure	N
Historical layers	Verbalized world	N
Interpretation of symbols	Understand the language	N
Emotional bonds	Feel free to express opinions	Y
Perceptual Appropriateness		
Visibility	Limited by the screen; hyperlink to the details	N
Proximity	Electronic proximity	N
Reference cues (presentation form)	Text and images	N
Interpretation of reference cues	Conceptualized; No categorized-knowing to guide behaviors	N
Response time	Asynchronously	N
Behavioral Appropriateness		
Presentation of self	Text and images	N
Control of viewpoint	Through the interface	N
Control of action/reaction	The understanding of the culture and the language is required	N

Table 6-4. The potentials and problems in telepresence environments (applying the analysis scheme)

- **Functional appropriateness**

The design of current telepresence environment fulfills functional appropriateness. The telepresence environment platform achieves accessibility, affordance, accommodation to special events, and connection to the outside world. There is no spatiotemporal constraint in telepresence environments. Users can choose to log-in and socialize with other anytime from anywhere. Also, telepresence environments provide an alternative method for individuals to participate in public affairs. Unlike in copresence and tele-copresence environments in which requires people to congregate together simultaneously, the interactions in telepresence environments are usually asynchronous. Users have more flexibility to choose when to interact with others. Besides, for affordance, although each site covers a single activity, the use of hyperlinks in the Internet covered all possible interpersonal activities that people have done in physical public spaces. For example, people-watching can be done by browsing video sharing website (e.g. YouTube), personal blogs and social networking sites (Facebook).

- **Conceptual appropriateness**

The achievement of conceptual appropriateness in telepresence environment is complex. Although the environment lacks visual pleasure and historical memory, they provide extra social pleasure and the experiences create emotional bonds to the environment. First, as telepresence environments are made of verbal components, the environment lacks visual stimuli and historical symbols that are associated with the memory. However, these telepresence sites scales globally. As long as there is Internet access, people from around the globe can enter the site and have interactions with each other. Meeting with people from various social and cultural backgrounds adds to social pleasure. Also, telepresence environments provide people with a platform to freely exchange idea, views and ideologies with strangers. As a result, the mental need of socializing is fulfilled.

- **Perceptual and behavioral appropriateness**

Because perception and interactions in telepresence environments are mediated through text, the perceptual and behavioral appropriateness are weak. Throughout our experience in the real life, we did not establish the ability to verbally communicate with strangers. It is difficult for users to detect and identify reference cues and relate these cues to proper behaviors in telepresence environment.

The verbal interactions in the telepresence environments lack visual cues. Individuals find it difficult to sense social presence and sometimes lose the ability to respond to each other. In these text-image virtual environments, part of the appearential cues can be fulfilled by the screen name, profile image and personal profile, but the spatial and behavioral cues are missing. As result, the appropriate response is difficult to decide. From my observations, short comments without users' identity receive no response or an entirely irrelevant feedback pervasively.

Since people react with each other through the typing of text, the action and reaction requires an extra step of conceptualization. The familiarity of the language is required for a successful interaction and to behave appropriately. For people who do not grow up in the culture of the language, it is possible to misunderstand the reference cues, then subsequently to act improperly.

Chapter 7 Conclusion

This chapter concludes the thesis. It first discusses the lessons learned from observations and analysis. The methods to improve the design of privatizing public spaces and socializing private spaces are elaborated. The final part of this chapter covers the conclusion, significance and future directions of this research.

7.1 Lessons Learned from the Experiment

Among all kinds of public spaces, the most-used environment is considered as a successful one, whether it is a virtual or a physical public space. It facilitates social experiences and provides the sense of place. However, different challenges face the design of physical and that of virtual public spaces. As discussed in Chapter 6, the design of privatizing public spaces needs to work more on functional and conceptual appropriateness. On the other hand, the design problem of socializing private space requires more improvements in perceptual and behavioral appropriateness. By learning from each other, this research aims to provide suggestions to spatial designers and developers of information technology.

7.1.1 How to Improve Privatizing Public Spaces

Physical spaces are made of physical objects. In order to build a successful physical public space, it is important to properly design the form to fit into users expectations and arrange objects to accommodate a great diversity of activities. Ever since the introduction of digital media devices in public environment, users' motivations, goals, intentions and activities in public spaces have changed. It is important for spatial designers to learn from successful physical public spaces and from virtual public spaces. After observations and analysis of different types of computer-mediated public spaces, it is clear that the design of privatizing public spaces need to emphasize on the following:

- **Turning digital media devices into a triangulations**

By turning the digital media device in to a triangulation, digital media devices become an extra factor for visual and social pleasure. As the display of the digital media devices is shared among a group of strangers, it becomes a centripetal effect to pull people together and social discussions occur around it. Further, the shared digital content adds to visual pleasure. The unexpectedness and entertainment features in the shared monitor are an extra source for people-watching and scene-viewing.

- **A compound of the first, second and third place**

In order to support the diversities of activities for multiple uses, the design of physical public spaces need to accommodate a more complex public life. Group users enter public spaces for the enjoyment of informal public and private life⁹. Whereas solo users with digital media devices usually participate in formal and informal public activities together while being locating

⁹ Therefore, for group users, a public space is a hybrid of the third place and the first place.

in current public space¹⁰. To satisfy the expectations of them, a physical public spaces should be equipped with the qualities of the first, the second, and the third place.

- **More tolerance of multiple presentations of self**

Reflecting to the mixed use of public spaces, the environment needs to equip with more tolerance of multiple presentations of self. In current public spaces, while interacting with different interaction partners, people jump back and forth the between different personalities and identities¹¹. The presentation of self is fluid and not fixed.

- **The semi-open relationship to the outside world**

The visual access plus the geographical division between the public space and the outside environment is the key requirement to a successful public space. The visual access to the outside world provides supplementary to people-watching and scene-viewing; whereas the geographical separation between inside and outside word endows the space with a sense of security.

- **Blur the line between fantasy and the reality**

Events that seamlessly connect digital media devices to the physical world blur the line between fantasy and the reality. This kind of events, such as urban games, facilitates social interactions and attaches the sense of place to public spaces.

7.1.2 How to Improve Socializing Private Spaces

Virtual spaces are constituted with bits and bytes. A successful virtual public space relies on the design of the proxy and interface. Unlike physical spaces that need to support multiple activities, each site can be specialized and supports single activities. Some sites are good for people-watching, some are more suited for social discussions, while others are used to satisfy the need of fit-into-crowd. The multi-activities requirement of public spaces and the extended relationship to the outside world is achieved by hyperlinks. By clicking hyperlinks, users are able to visit different socializing private spaces and participate in diverse activities. However, each of these sites offers different types of interface, and the unlikeness from one site to anther confused users who move among them. The design of socializing private spaces need to focus on the perception elements and the control of actions.

- **A holistic view and quick zoom-in**

A well-design virtual public space needs to provide visibility -- a holistic view to the environment and quick zoom-in function to the detail. A holistic view of the environment adds to sense of place and social presence. On one hand, it enhances the sense of orientation and leads to a deeper understanding of the environment. On other hand, a holistic view improves sense of social presence. As users are physically separated in physical spaces, the holistic view becomes a substitution for the close proximity (Ho, et al, 1998). Besides, the quick zoom-in

¹⁰ In this sense, for solo users, a public space is a mix of the second place and the third place.

¹¹ For group users, who enter physical public space with a group of acquaintance, they constantly switch their role between a good friend/family in private life (in front of the acquaintance) and a good citizen in the society (with strangers). For digital media device users, their personality and identity is even more fluid depends on which site they are visiting.

enables users to rapidly pick reference cues from the environment and from the interaction partners, enabling them to make fast and accurate response.

- **Close to the embodied control**

The control of actions in socializing private spaces needs to design as close to the embodied movements as possible. For users, embodied movements enable them to automatically apply reference cues to themselves, such that they can receive expected response. Furthermore, the interface should provide more actions. These extra actions endow the environment with excitement and sense of place.

- **Identifiable codes**

The form and symbols in socializing private spaces need to use metaphor from physical public spaces. With an integrated coding/decoding system that coordinates experiences from the physical world and the virtual environments, users develop the ability to conceive appropriate behaviors avatar-animation public spaces and in text-image one.

- **The option of coming in as a group with acquaintances**

A virtual public space needs to provide the possibility of group activities. Users in current public spaces are used to participate in public life with acquaintance. They usually enter public space as a group, and as the result, they have lost the ability to interact with strangers alone. The company of acquaintance provides users with a sense of security and helps them improve social skills.

7.2 Conclusion

The goal of this research is to explore social experiences in computer-mediated public spaces. After literature review, the experiment and applying the analysis scheme to the observations on copresence, tele-copresence and telepresence environments, it is clear that each type of computer-mediate public spaces is equipped with its social potential and design problems. By learning from different types of computer-mediated public spaces, some suggestions to designers of public spaces and the developer of digital media technology are generated.

On one hand, as digital media devices are ubiquitously used in physical public spaces, physical public spaces are isolated and privatized. The traditional theories of place-making in public spaces are challenged. Since it is impossible to forbid users to carry digital media devices to the environment, the solution would remain in the design of spaces. By re-imagining behavioral patterns of different types of users, arranging objects and forms to fit users' expectations and activities, and imposing digital contents on the physical environment, the physical public spaces would become more pleasing and inhabitable.

On the other hand, although the experience in current virtual public space somehow forms sense of place, the existing design is still primitive and the interface is still problematic. When entering virtual public spaces, users lose the ability to spontaneously comprehend and automatically react to the physical spaces. The environment would be more recognizable and the experiences would be more enjoyable if the interface of virtual public spaces resemble the physical world. The ultimate goal of information technology would be to develop a transparent interface that seamlessly attached to the current physical spaces. By observing social interactions in successful public spaces, the developers of digital technology form a more

comprehensive understanding of human behaviors and the ability to build an interface that closely match human sensory perception and embodied actions.

7.3 Significance

The outcomes of this research include: 1) a research methodology for investigating social presence and social interactions in public spaces, 2) an empirical theory that explains the role of visibility to the interaction partner in social experiences in computer-mediated environments, 3) an analysis that characterizes the potentials and the missing elements of different kinds of computer-mediated public spaces. The lessons I learned from this research provide both spatial and technology designers a better understanding of digitally mediated social behaviors and consequently improve the design quality of public spaces. Furthermore, it provides an effective methodology for the study of social experiences in several disciplines.

The conclusion of this research reforms the concept of cyberspace design. Digital technologies have created a new kind of space, cyberspace, which is composed of information and exists in parallel with the physical world. It is an alternative environment for people to participate in economic, cultural, educational and social activities (Dreyfus, 2001; Kalay, 2004; Mitchell, 2004). Facebook, for instance, is a social networking website in which users can interact with other users and review each other's profiles -- just like people watching in an urban plaza. Another example is Second Life. It is a three-dimensional virtual world where users can explore their environments and socialize with other users -- similar to what people actually do when they walk around on streets. Although information spaces are not constructed with physical materials, they have the characteristics of a place, such as immersion, habitation, presence, memorable experiences and social meanings (Anders, 1998; Dyson, 1998; Wertheim, 1999). In this aspect, the information space becomes a new frontier for spatial designers to create livable environments.

Sociologists and psychologists have developed environmental behavior theories to understand the relationship between human behaviors and the surrounding environments. By adopting these theories, spatial designers such as architects, landscape architects and city planners are able to create spaces associated with social meanings and emotional engagements to users. Comparing with the design of physical spaces, the creation of virtual environments is a relatively new field. Human behaviors and social interactions in this new environment are not well understood. Therefore designers lack guides to shape inhabitable spaces in the virtual world. As Anders claimed, "*it is a kind of architecture without architects*" (Anders, 1998). Instead of applying spatial design theories, most information space designers focus on documenting metaphor and the organization of data. They are creating spaces for data, not for people (Donath, 1997; Kalay, 2004). As a result, the environmental quality and the socio-cultural significance in the virtual world are absent.

Architectural design is defined as the art of place-making that attaches social and cultural meanings to the configurations of spaces (Kalay, 2004). Based on this definition, architectural design is not just about the arrangement of elements such as materials, furniture and colors. Rather, it includes the creation of social and cultural contexts that can be applied to the physical as well as the virtual world. As Compbell described, "*...both use architectural*

organization as a way to order forms and spaces in the environment. Both strive to create meaningful place by defining space, and both must allow the participant to develop a cognitive map to orient and navigate in the space” (Compbell, 1996). Therefore, existing public spaces design theories can play an important role in creating inhabitable virtual spaces. By borrowing from the design principles and spatial metaphors, it is possible to transfer the information spaces into meaningful and memorable places (Donath, 1997; Kalay, 2004).

However, blindly applying environmental behavior theories from physical spaces to virtual environments will not work. Both physical and virtual spaces have their own constraints and strengths (Compbell, 1996; Kalay, 2004). Physical spaces are composed of materials and sensed by body, while virtual spaces are wholly mediated and synthetic (Donath, 1997). Hence, the success of physical place depends on the harmonious arrangement of spatial elements that deliver social and cultural meanings, whereas the success of virtual place design places more emphasis on human experiences, such as the perception of behavior cues and the facilitation of feedback. Consequently, to create an inhabitable sociable virtual space, it is necessary to balance the metaphors of traditional public spaces and the creation of new social experiences.

The conclusion of this research improves the process of creating physical spaces with lessons learned from virtual spaces. It helps designers to know more about environmental behaviors, to redefine the concepts of public spaces, and to evaluate the performance of the design. The evolution of information space does not eliminate the use of physical space but support it. As Mitchell depicted the relationship between physical and virtual environments as *“physical settings and virtual venues will function interdependently, and will mostly complement each other within transformed pattern of urban life rather than substitute within existing ones. Sometimes we will use networks to avoid going places. But sometimes, still, we will go places to network”* (Mitchell, 2004).

First, the study of information space will complement current theories of physical space design by sharing knowledge about environmental behaviors. Human is a complex social animals with diverse personalities, desires, values and other qualities. Scholars have spent many years exploring how people perceive, interpret, react to and influence the environment in disciplines ranging from environmental psychology, urban anthropology and behavioral geography. However, the theories and methods are evolving, just as human behaviors and technologies are evolving. Thus, it would be insightful to incorporate the investigation on behavioral and interaction patterns in virtual spaces with current architectural design theories.

Second, spatial designers need to think about how to seamlessly interweave computer-mediated technologies with physical public spaces. The ubiquitous use of computer media has challenged the existing concept of private-public continuum and raised new concerns for architects, landscapes architects and city planners (Cuff, 2003). For example, the user with computer-mediated device, such as laptop with Wi-Fi and cell phone, can continuously interact with his acquaintances via the device. This interaction forms a private zone in the public domain. Because he pays no attention to the surrounding physical and social environment, both digital media device users and public space occupants experience weakened sense of being together and being in public. Therefore, the exploration of social experiences in both virtual

and physical computer mediated environments can help spatial designers to design an inhabitable physical public environment where public awareness is easily maintained.

Finally, three-dimensional information space can become an experimental pool for physical space creation. In the process of architecture design, it is often difficult to measure the performance of the building and to foresee how people will use it before the construction is actually built. Current evaluation methods such as case study, POE and behavior simulation may lead to some misunderstandings because either the building components or the users are not genuine. By observing how actual users walking through and experiencing the virtual room with real spatial elements, designers can better predict human behaviors and evaluate design concepts before the building is built.

7.4 Future Research Directions

The measurement of computer-mediated public spaces is a complex process. It evaluates the arrangement of objects, the form of the environment, the perception and the control of behaviors. This research has selected different types of computer-mediate public spaces as the observation and analysis targets. However, to complete the study of social experiences in computer-mediated public spaces, it is necessary to observe more public spaces.

In order to closely compare and examine privatizing public public spaces, this research selected only one kind of public space, coffee shop, as the observation target. There are other types physical public spaces, such as urban plaza, libraries and museums. People might carry different expectations and intend to perform different activities in other types of physical public spaces. These different targets lead to an extended conclusion about physical and social requirements in current public spaces.

It is beneficial to collect behavioral data from more virtual public spaces. This research only selected game environment and news forums as the observation target. Different kinds of public sites exist on the Internet for different social functions, such as video sharing, social networking, and opinion expressing. People carry different expectations and goals to different public sites as each of them supports a specific activity. The observations from other virtual public spaces might challenge the findings in this research.

Furthermore, to advance this research, it is required to explore wider breadth of newly invented information technologies and connect them back to the design of public spaces. It is mentioned in this thesis that the sharing of digital content and urban games improve social experiences and sense of place. However, as the development of information technologies evolves, there are other possible means to impose digital contents on the physical world. Therefore, it is crucial to step outside of the barrier of spatial design and integrate the elements of spatial design with the development of digital technologies.

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