[SENSORY PERCEPTION AND SMARTPHONE USE IN PUBLIC SPACE]
INDEPENDENT RESEACH PROJECT 2016
MIN KYUNG SEO

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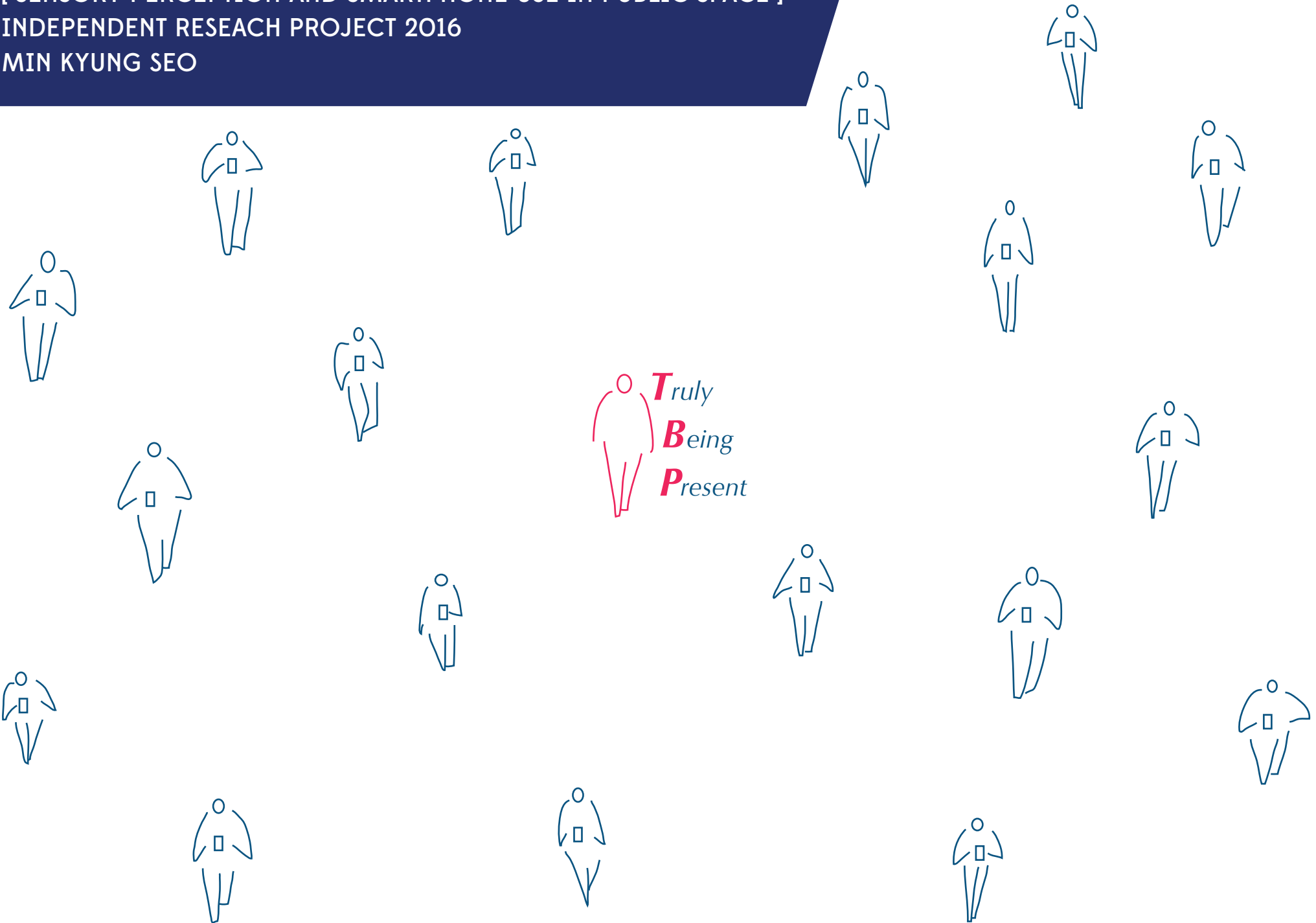
SENSORY PERCEPTION AND SMARTPHONE USE IN PUBLIC SPACE
by Min Kyung Seo

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Approved:

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[Michael Rios], Independent Project Chair

_____

[David de la Peña], Independent Project Advisor
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ABSTRACT

The following research explores the relationship between the sensory qualities of public spaces and space users' smartphone use in order to tackle the problem of people's excessive engagement in cyberspace and psychological detachment from the immediate surrounding. The research focuses on validating whether different sensory experience affects the level of smartphone use in the public spaces. The findings of the research informs the design of urban interventions that can be used for an innovative guideline for a city.

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INTRODUCTION

Figure 0-1. Illustration of a smartphone

The development of digital technology has increased invasiveness of technologies. Its omnipresence is so apparent that in the modern Western society it has become impossible to evade its effect. Besides physical or mental problems caused by compulsive technology use, technology diminishes our opportunities for spatial and temporal perception in real space by captivating our senses and accelerating the subjective speed of time. Our lives are based on our subjective perspectives during direct experiences along the passage of time. However, invasive technology has altered the stream of time, dividing a moment into the smallest unit of a second that we cannot have the inner experience of (Dawesar, 2013). The time of the digital world does not run in the digital world in the same way that it does in the natural one. Things that we experience in digital world such as Twitter streams or news from other time zones are not the present because they are always a few seconds ahead. Due to the heavy engagement in the altered flow of time, our

experience is no longer embedded in real space but rather superficial in cyberspace. Many researchers identify the deprivation of our direct experience and perception of real space in the digital age. Following Juhani Pallasmaa, I concur that the experience of space is multi-sensory; qualities of matter, space and scale are measured equally by the eye, ear, nose, skin, tongue, skeleton and muscle. In the digital era, the perception of space through multi-sense has been distracted by omnipresent technology. However, distracted by this compelling technology, we are losing physical or psychological reference of our own state; for instance, the second that you bite into a pastry or the three hours that you lose yourself in a great book. It is because the domination of visual and auditory sources block out other sensory perceptions regardless of where we are. In order to promote the significance of truly being in the present with the help of multi-sensory experience, I want to explore the relationship between the sensory of a space and the level of people's engagement with smartphones. The research focuses on evaluating sensorial elements of multiple urban spaces and comparing different percentage of smartphone users in those spaces. The study aims to assess if different levels of sensory stimuli and comforts of spaces affect the level of people's technology use.

PROBLEM STATEMENT

1 . IMPACT OF TECHNOLOGY IN HUMAN BEHAVIOR

The rapid development and high level of pervasiveness of technology in general have changed human behaviors in our society. Andy Clark (2008)'s observation on humans' tendency to be engaged with artificial tools within a highly complex network reveals "a decrease in reliance on biological rhythms and a proportionally increasing dependency on the requirement dictated by the tools that we use" (Colpani, 2010). As technology replaces activities and skills performed by the human brain, people are unconsciously occupied by other activities necessary to complete the machines' task. "Electricity, as well, altered our day/night schedule to such an extent that our circadian rhythms are no longer based on biology, but rather on socio-economically established production time. If we reflect on the day/night and work/leisure dichotomies, we can observe how these rhythms are changing with the spread of the internet and the rise of the 24/7 economy" (Colpani, 2010, 39). Integrating technology in our lives, we have accustomed our bodies, complied and refined our skills and learned to cooperate with machines.

Apart form the physical changes caused by technological development, the increase in people's engagement with technology has caused changes in their psychological states. Misra (2010) asserted "individuals have distinguishable orientation towards their environments based on their connectedness and commitment to place-based and virtual settings, the focus of their identity, and the satisfaction of their socio-emotional needs" (Misra, 2010, 3). The environmental orientations vary along a spectrum ranging from spatial orientation to virtual orientation; along this continuum, there are four different modes - placeless, place-based, place-cyber based and cyber-based. "The Place-Cyber based people whose identity and socio-emotional satisfaction comes from both real and virtual settings are the majority of people in contemporary society and the Cyber-Based people whose identity and satisfaction of needs come predominantly from virtual settings are for instance Intensive online gamer or the Internet addicts" (Misra, 2010). The research focused on these two modes of orientation to compare the level of perceived information overload and psychological, health and community outcomes. The qualitative method of the research concluded that excessive engagement in virtual space diminishes individuals' sense of place-based community; it diminishes

people's time and inclination to engage in contemplative activities and have adverse effects on people's health and well-being. Therefore, the Internet use may detach people from the immediate socio-physical environment (Downes, 1998).

2 . THE CHANGE OF COGNITIVE PROCESS IN DIGITAL AGE

I. Impact of Technology in Rhytm and Flow of Time

Dawesar (2013) explains the significance of time when we build our identity and define ourselves. The process of forming an identity is based on two dimensions of time: the lapse of time during our lifespan and each moment of immersive experience, which comprises the former timeframe. Her perspective on different timeframes of technology asserts that technology has altered the flow of time. While technology increased lifespan of people, it shrank the smallest measure of time, the moment (ibid). Science behind technology allows reams of data to be processed in the smallest unit of time. However, this will only widen the gap between the passage of time in the reality and digital world. As human is biologically designed to respond to the nature's rhythm such as the sun, the moon and the seasons, people obsessed with technology are busy chasing after the instant and superficial experience within the smallest unit of time instead of building up the immersive experience.

"What we feel as our ordinary everyday embodiment is only one actualization of intersecting sensory and proprioceptive virtuality, concret-ized over a period of time into habits and recognizable rhythms" (Munster 2006, 115)

In this statement, Anna Munster elaborates on how immersive virtual environments can challenge our body and space awareness by altering the "recognizable rhythms" that we learn over time (Colpani, 2010). The unprecedented amount of information and visual sources conveyed though cutting edge technologies has captivated us in virtual world. According to Anna Munster's analysis of new media aesthetics, "lag and speed are the new parameters for distance and proximity" in a digital environment. Since the rapid development of bandwidth that aims to minimize processing time, people have been attached to speed while using media for many purposes; for instance, people are keen to immedi-ate response to their action and often obsessed with instant online services. "The craving for speed is connected to an extreme attempt to be present in the reality of communication that we experience online. This digital presence can isolate us from the space and time coordinates of reality and draw us into a vortex of feedbacks, responses, networks and

inputs that makes us forget our "real time" and "real space, our neighbors, colleagues, and living environment" (Colpani, 2010).

According to McLoughlin's quantitative research on the difference in perception of time between individuals with high and low level of computer usage, it is tested that using technological devices increased the pacemaker within people and it causes them to believe that time is passing more rapidly than the real time. As the pace of life speeds up, the subjective feeling of available time decreases, therefore causing a sense of time pressure within individual (McLoughlin, 2012). Although McLoughlin did not consider a faster pace of life as a total negative, she suggested that the rapid time perception would lead to an increase in time-stress, which is associated with heart disease and distress.

Colpani comprehends the altered flow of time by delineating the blurred line between past and present. Without experiencing in person, we are able to reconstruct past events through signals such as objects and documents (Colpani, 2010). As we experience the world through television and the Internet more frequently, bombarded by constant mediation of contemporary events, we lose contact with the occurrence itself in its physical spacetime. Therefore, losing the sense of

reality in signals results in abolishing the past or blurring the line between past and present.

Being present in real space is important due to chances of immersive interaction with surrounding environment and memories based on the interactive experiences. The memory generated during real experiences gives to "perception an individual conscience, that is to say, it gives subjectivity to the knowledge of reality."(Pellitero, 2011). Massumi (2002) expands on the experience in a relation to cognitive process. He identifies experience as an indispensable constituent of our perspective apparatus in different ways. Colpani (2010) refers to him in explanation of "there is no "raw" perception. All perception is rehearsed" (Massumi 2002, 66). Similarly, Henri Bergson (1986) stated "Every perception is already memory" (84). Therefore, loss of real experience will affect the level of cognition since there will be less references for a person to make when he or she has to project a subjective perspective on reality.

Based on evidences and theory on the time-warping characteristic of technology in the digital age, it is concluded that technology use accelerates time perception and segregates people from real space. Therefore, there is urgency for us to tune into the stream of real time and grab the moment that we are truly be present in.

II. The Body and the Senses: Perception of Space

While architecture should articulate the experience of existence and strengthen our sense of reality and self, the dominance of sight over other senses in the contemporary urban setting incites the feeling of detachment and alienation, unlike the forceful emotional engagement of natural and historical setting. Pallasmaa (2005) believes that many aspect of pathology in architecture can be explained through the analysis of the epistemology of the senses, a critical review on an imbalance in our sensory system. For instance, the feeling of disconnection from physical space in the digital age is due to the elimination of peripheral vision and a narrow range of vision directed on technological devices. He emphasizes what makes people remember the space is not so much about the uniqueness of the place, but that the body forms enough association with the space through the compromising relationship; while a person lends his emotion and association to a space, the space provides its aura to the person. Pallasmaa accentuates the significance of the body by saying that "my body is truly the navel of my world, not in the sense of the viewing point of the central perspective, but as the very locus of reference, memory, imagination and integration" (Pallasmaa, 2005, 11). He articulates the role of architecture in providing the ground for perception and the horizon of experiencing and understanding the world in order to amplify one's sense of being in the world. It is significant to understand the collaborative function of all senses that strengthens one's sense of reality through constant interaction (ibid). Pellitero (2011) supports the growing emphasis on the environment as a true phenomenological experience in the digital age. Similar to Pallasmaa, she criticizes that the overwhelming stress on visual sense such as mass media; Information and Communication Technologies (ICTs) hamper "...the recall and recollection of visual models stored in the mind" (Pellitero, 2011).

Colpani (2010) accentuates the relationship between experience and sensory perception. He refers to Massumi's experiments that had been conducted to research how exteroceptive senses – vision, hearing, taste, and smell – collaborate to establish our perception of space and of body. The experiments concluded that the performance of every sense was poor when the sense was segregated from other sensory channels. For exam-

ple, "the isolation of vision under specific circumstances could lead to hallucinations, with participants in the experiment unable to describe the color, shape, and dimensionality of the images they saw." (Colpani, 2010, 21). Based on the result of theses experiments, it is concluded that "the form-creating capability of our brain theorized in Gestalt psychology relies on the cross-referencing activities of our sense and our proprioception"(ibid, 21) - a process of sensorial perception in our body that "translates the exertion and ease of the body's encounters with objects into a muscular memory of relationally."(Massumi, 2002:59).

Accordingly, it is evident that domination of vision over other senses through technology in contemporary society has diminished the opportunity of immersive experience in reality, thereby distracting people from having cognitive interaction with the surrounding environment. Although there have been theories emphasizing the significance of multi-sensory in providing the ground for perception, the current society lacks in integration of senses in the public spaces.

PURPOSE STATEMENT
& RESERACH QUESTION

This research addresses the issue of people losing physical and psychological reference to surrounding environment in terms of space and time while they are compulsively engaged in the cyberspace. As significant factors in forming one's memories and identity, physical and psychological reference derive from an immersive experience in the reality. An immersive experience, opposed to an instant experience in a cyberspace, is an involvement that brings us opportunities to reflect on our own state spatially and temporally. According to the definition used in phenomenology, "spatial reflection is inquiring into the ways we experience spatial dimensions of our day-to-day existence and time reflection refers to subjective time as opposed to clock time or objective time" (Phenomenologyonline). Because technology use distracts people from engaging in real space, there is a need to assist people in moving away from cyberspace and give themselves the chance to enhance immersive experience. With the purpose of restoring people's attention in physical space, my research aims to assess the relationship between sensory stimuli of spaces and the level of space user's engagement with their smartphones. Based on the purpose and goal of my research, the research question is as followed:

How is the sensory experience in a public space is related to the level of people's technology use in the place?

RESEARCH METHOD

Figure 1-1. The Sensory Notation Radar Chart

The research focuses on verifying the correlation between sensory elements of spaces and level of smartphone use in those spaces. The hypothesis of my research is that a space with pleasant sensory stimuli would encourage people to engage with surrounding environment while a space with undesirable sensory stimuli such as noise and smokes would not attract people's attention to the surrounding, therefore allowing more people to be on their electronic devices.

In an effort to validate the relationship, I compared spaces based on high and low level of sensory comfort and percentage of smartphone users in those spaces. Two places with busy and noisy environment and three places with calm and quite environment were selected to be compared. Prior to the comparison, sensory analysis of these places was conducted, using the sensory notation radar chart
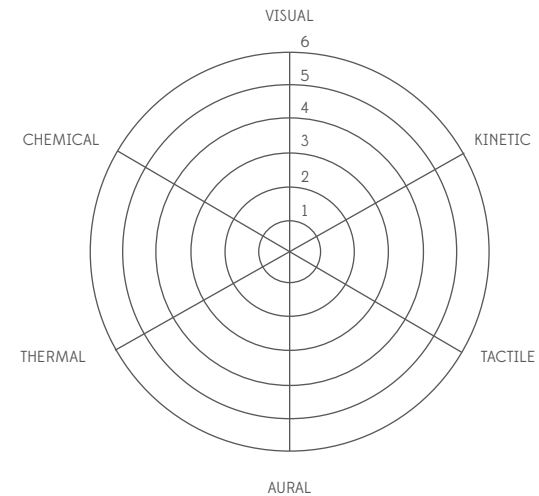
(Figure 1-1) developed by Raymond Lucas. The notation chart is designed as a tool to record non-visual senses such as olfactory, gustatory, tactile and aural environments. This method helps producing qualitative data of six perceptual systems – visual, kinetic, chemical, aural, thermal and tactile. Each system consists of detail components. The visual system includes all effects of light, transparency and color. The kinetic system refers to the movement of crowds and traffic. The chemical system combines scent and taste. The aural system involves all effects of sound as experienced, clarity, amplitude and pitch. The thermal system indicates temperature and humidity. Lastly, the tactile system encompasses touching materials and texture of ground (Lucas, 2009). The

Radar diagram depicts the sensory priority, corroboration, temporality and quality. In order to focus on comparable factors of six sites, the research focuses on the sensory priority and quality. The sensory priority notates the importance or dominance of six sensory perceptions in the scale from one to six. This gives a picture of the most affective sensations down to those, which are least important and least affective. The quality of sensory is recorded with a word from the list (Figure 1-2) given to characterize each of the six perceptual systems.

The comparison of the observed information aims to discover whether the quality of sensory experience is relational to the percentage of smartphone users in study sites. There are three possibilities for the relationship. Although the negative correlation is anticipated in my hypothesis, the result could be positive or unrelated. The negative correlation refers to the case when high quality of sensory experience results in low percentage of smartphone users in the site while the positive correlation means high quality of sensory experience results in high percentage of smartphone users in the site. Unrelated relationship indicates that the quality of sensory experience and the level of smartphone use do not affect each other.

VISUAL	AURAL	TACTILE	KINETIC	THERMAL	CHEMICAL
Dark	High Pitch	Static	Strong	Hot	Weak
Bright	Low Pitch	Mobile	Light	Cold	Intense
Saturated	Quiet	Rough	Free	Dry	Stagnant
Neutral	Loud	Smooth	Bound	Wet	Fresh
Perspectival	Clear	Light	Indirect	Natural	Musky
Flat	Reverberant	Heavy	Direct	Artificial	Putrid
Intimate	Vocal	Porous	Level	Ambient	Floral
Vast	Non-Vocal	Resistant	Graded	Source	Fruit
Solid	Natural	Hard	Sustained	Radiant	Spice
Void	Artificial	Soft	Quick	Convective	Resin
Detailed	Attack	Warm	Crowded	Constant	Meaty
Blank	Decay	Cold	Empty	Responsive	Oily

Figure 1-2. Chart of descriptor terms

The study sites to execute the observation are four plazas and one Bus stop area located in and around the Financial District of San Francisco. The study sites were selected based on the following criteria: concentration of electronic device users and sensory quality of sites. Based on my hypothesis, sites with unpleasant sensory stimuli are expected to have more people engaged with their smartphones. Mechanics Monument Plaza and Pine St & Davis St Bus Stops were chosen to represent the study sites with unpleasant sensory stimuli. The distinct characteristic of both sites is their proximity to the Market Street, the boisterous artery of San Francisco. Smoky and noisy environment is expected to be where people do not intend to stay but most likely have to stay for some unavoidable reasons such as waiting for bus or eating near by their offices. Therefore, people in those spaces are anticipated to engage themselves in cyberspace rather than paying attention to the immediate surroundings. On the contrary, three other sites - the Ferry Building waterfront area, Levis' Plaza and Portsmouth Plaza - are located away from the heart of the Financial District and more spacious than the sites in former category. These sites were selected as places where people would intend to visit for comfort and rest in better quality of sensory experience, thereby based on my hypothesis, these places are expected to have low percentage of smartphone users.

DATA COLLECTION

Description of Sensory Experience

      The Ferry Building waterfront is a linear space between the ferry building and the ferry terminal so the area has constant pedestrian movement. The space is narrow and intimate compared to typical plazas, but bright and open to the bay. Regularly arranged wooden benches and concrete floor represent the hard and resistant surfaces. Due to arriving ferries, salty air combines with the smell of smoke and fuel. Except the sound of ferry engine, the aural is decently quiet and calm with low pitch of people talking, sea gulls' chatter and clacking sound of utensils from restaurant's patio seats

Ferry Building Waterfront

percentage of smartphone use

Visual
Bright
Flat
Intimate

Kinetic
Direct
Sustained

Chemical
Salty
Smoky
Stagnant

Aural
Vocal
Artificial

Thermal
Natural
Cool

Tactile
Hard
Resistant

Figure 2-1. The Sensory Notation of Ferry Building Waterfront
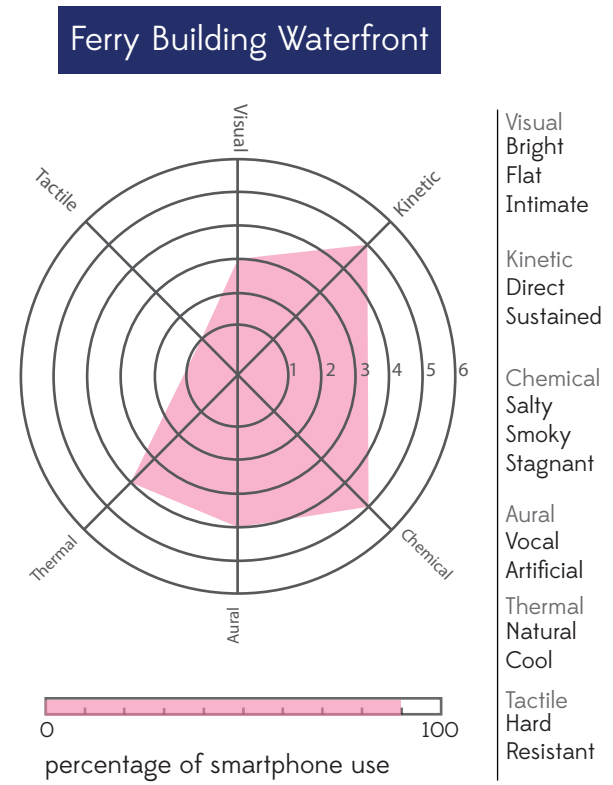

Figure 2-2. Photograph of Ferry Building Waterfront

Observation and Analysis of Space Users

Approximately 90% of the space users were engaged in their smartphone in the Ferry Building waterfront. People in the waterfront area are largely divided into two groups: people who are waiting for the ferry and people who come for bay view and breeze. Those waiting for the ferry were killing their time with their electronic devices. The most common behavior of those who stayed in the space was sitting on the benches that are installed to face the bay and looking down at their smartphones. Many people were having lunch or snacks purchased in the Ferry Building. While they are having lunch with one hand, they did not put their phones down, holding them on the other hand.

Although visiting waterfront is considered a resting point from the loud and boisterous urban setting, it was surprised to see that many people were not taking advantage of the sensory experience that waterfront provides.

In this space, groups of tourist were distinguishable from people who have been to the place or visit the place in a regular base. People who seem to be residents of San Francisco or working around the Ferry buildings looked familiar with the place and they were in jogging attires or office outfits while tourists seemed excited and they were wearing backpacks and cameras.

Those who were familiar with the space were not interested in visual experience in the site and rather engaged with their smartphones. However, tourists were compelled by the bay view and engaged in the visual, aural, thermal experience. This observation informs me that people were using their smartphones because other visual and aural sources from the smartphone are more compelling than the familiar surroundings.

Figure 2-3. Photograph of space users at the Ferry Building Waterfront

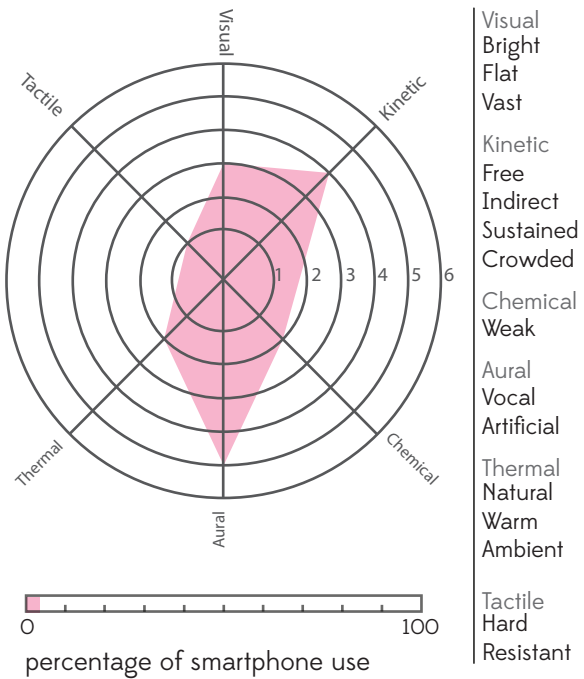## Portsmouth Plaza

Figure 2-4. Photograph of Portsmouth Plaza

Visual
Bright
Flat
Vast

Kinetic
Free
Indirect
Sustained
Crowded

Chemical
Weak

Aural
Vocal
Artificial

Thermal
Natural
Warm
Ambient

Tactile
Hard
Resistant

percentage of smartphone use

0 ─────────────── 100

Figure 2-5. The Sensory Notation of Portsmouth Plaza

Description of Sensory Experience

The Portsmouth Plaza is a spacious plaza in the middle of the Chinatown adjacent to the Financial District. Accordingly 98% of people who occupy the place were Chinese elders. In contrast, the passersby were mostly young tourist of various ethnicities. Although the space was full of people, the movement was sustained and inactive. Due to groups of people playing board games or card games, murmuring vocals, laughter dominated the aural elements. On the background, the sound of a Chinese string instrument resonates from the corner of the space. Well bounded by trees

and the sloped grass area, the space was vibrant but clam.

Compared to the aural and kinetic experience, other senses were secondary. Tactile was limited to the wooden benches and hardscape paving. There was no distinct smell of the place.

Observation and Analysis of Space Users

In the Portsmouth Plaza, groups of three to five elders sat on temporary seats like plastic boxes or their own chairs and played different kinds of board games. Three to five people who stand aside and watch those games surrounded those players. The activate interaction between space users contributed to the low percentage of smartphone use in the space. The interaction is partially influenced by cultural characteristic of the Chinese elders.

Although the percentage of smartphone user in the space is the lowest with 5%, it is hard to determine that the sensory experience was the main reason. Instead it is largely because of the dominance of older population with their low interest in technologies in general.

The influence of cultural and generational aspect is more prominent when compared to other study sites. This is discussed further in the analysis section (pg._)
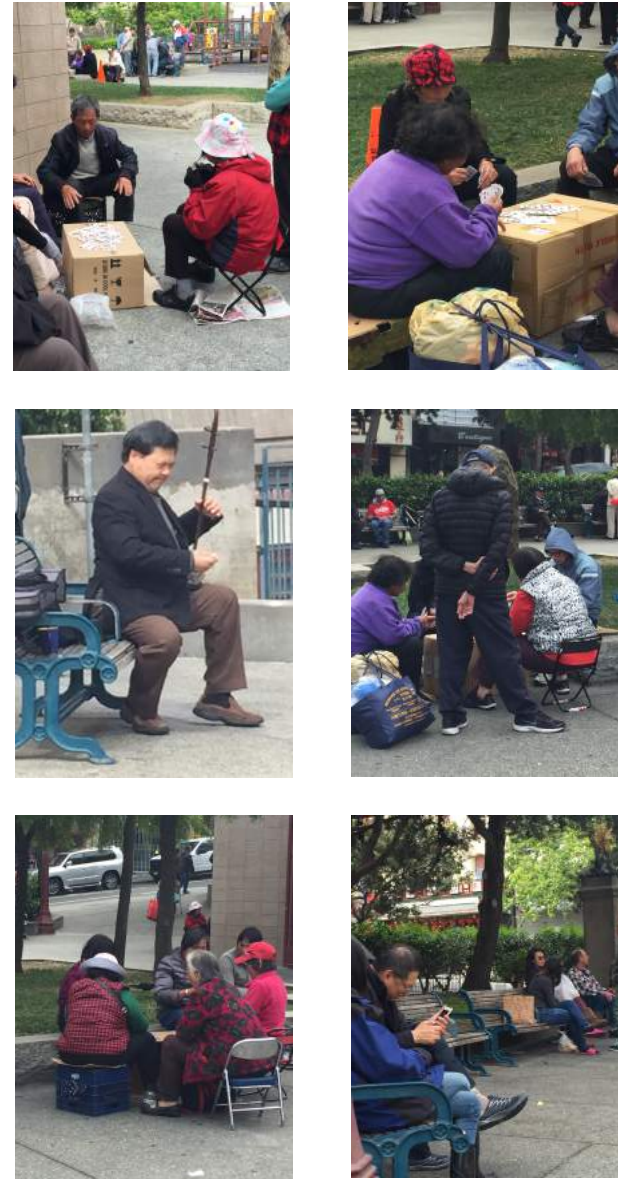

Figure 2-6. Photograph of space users at Portsmouth Plaza

Figure 2-7. Photograph of Levi's Plaza

Description of Sensory Experience

The Levi's Plaza is an urban plaza adjacent to the Embarcadero Boulevard and many offices. Despite of proximity to the large vehicle circulation, the plaza is protected from noises by dense trees, thereby providing a calm environment. Space users are sparsely seated both on benches and grass area. With the integration of grass and various size and shapes of vegetation, the tactile experience is light and soft. Since most space users are seated individually, the aural experience is mostly non-vocal: vehicles passing by and brushing sound of trees and shrubs.
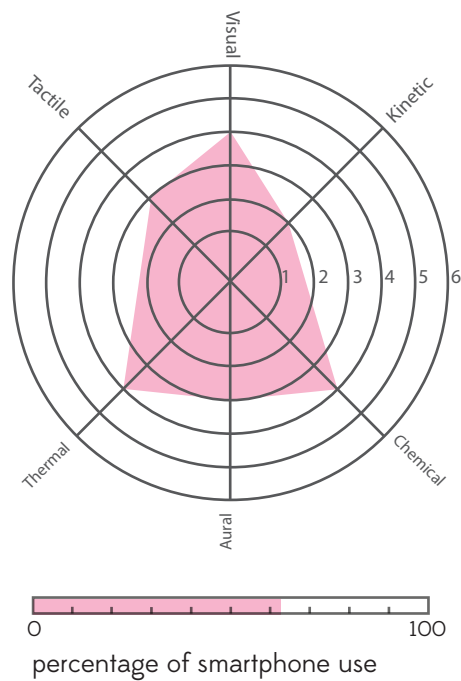
Visual
Bright
Neutral
Vast

Kinetic
Light
Free
Indirect
Sustained

Chemical
Fresh
Weak

Aural
Quiet
Low Pitch
Non-vocal

Thermal
Natural
Warm
Ambient

Tactile
Soft
Light

Figure 2-8.
The Sensory
Notation of
Levi's Plaza

percentage of smartphone use

0   100

of looking at computer screens in the office environment, they were indifferent to the surroundings but rather gazing at another screen. Many of them were receiving video and audio sources through their smartphones. It seemed like the smartphone was a compelling source to entertain people's break times.

Figure 2-9. Photograph of space users at Levi's Plaza

Observation and Analysis of Space Users

Approximately 63% of space users were using their smartphones in the Levis' Plaza. As the place is adjacent to offices, a lot of people were having their lunch break. Most of them were using their electronic devices while eating lunch. People who were not engaged in the smartphone were interacting with someone or sleeping or reading a book.

Although those young professionals were on their break from hours

Mechanics Monument Plaza

Figure 2-10. Photograph of Mechanics Monument Plaza

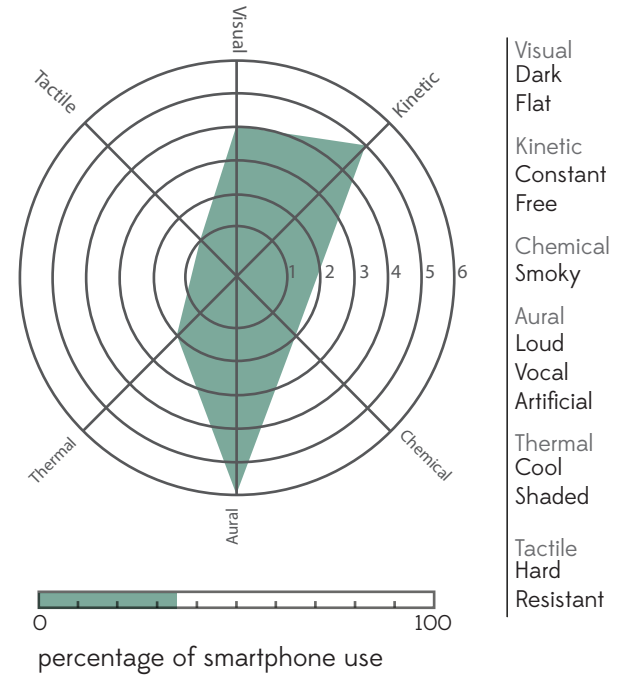|	
Visual	Dark Flat
Kinetic	Constant Free
Chemical	Smoky
Aural	Loud Vocal Artificial
Thermal	Cool Shaded
Tactile	Hard Resistant

0   percentage of smartphone use   100

Figure 2-11. The Sensory Notation of Mechanics Monument Plaza

Description of Sensory Experience

The Mechanics Monument Plaza is a small urban plaza along the Market Street. The movable metal chairs and tables provide places for people working around the area to have lunch break. Surrounded by tall buildings, the place is always shaded and cool. Due to the heavy and constant vehicular circulation on the Market Street, the olfactory element is dominated by smell of smoke and fuels. While vehicular movement creates constant noise in the background, people chatting in groups add vocal sounds in the foreground.

Observation and Analysis of Space Users

In the Mechanics Monument Plaza, 35% of the space users were using their smartphones. People were engaged with their smartphones in few different ways: talking on the phone, listening to music, and using applications on the smartphones. Since the research is related to the problem of being disconnected from the reality, people who were partially attentive were excluded from the targeted smartphone users.

The most prominent pattern observed in this place was related to the level of interaction. Every single individual who sat by himself was using their smartphones while people sat in groups did not use their phone at all. It was noticeable that smartphone use was a tool to avoid awkwardness of being alone and dealing with boredom

Figure 2-12. Photograph of space users at Mechanics Monument Plaza

Pine St & Davis St Bus Stop

Figure 2-13. Photograph of Pine St & Davis Bus Stop

Visual
Dark
Flat
Intimate

Kinetic
Direct
Quick
Crowded

Chemical
Smoky

Aural
High pitch
Non-vocal
Artificial

Thermal
Cool
Shaded

Tactile
Hard
Resistant

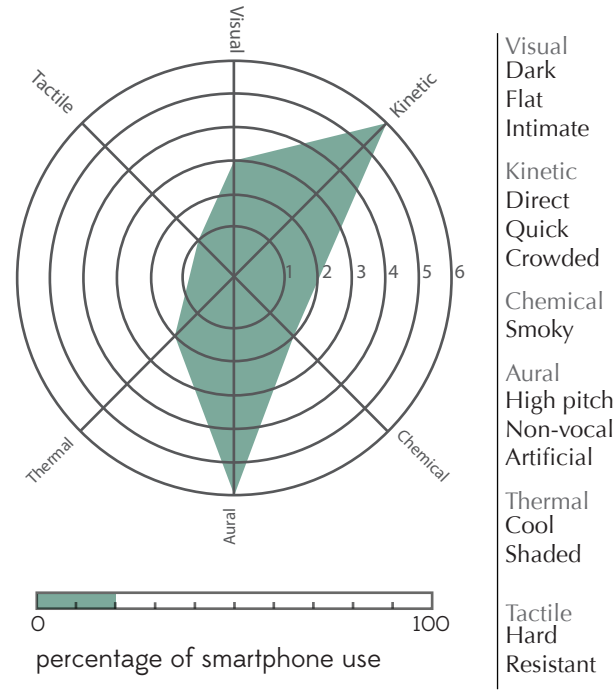percentage of smartphone use

Figure 2-14. The Sensory Notation of Pine St & Davis Bus Stop

Description of Sensory Experience

Pine St & Davis St bus stop area is a narrow sidewalk in the Financial District. Surrounded by skyscrapers, the area is shaded regardless of time. Both pedestrian and vehicular circulation is fast moving in one direction. Aural experience in this area is not pleasant due to the noises coming from the adjacent roads. The smell of smoke and fuel lingers around the area. Tactile element consists of rough and hard stone pavers and metal poles.

Observation and Analysis of Space Users

Opposed to the result of the Mobile Study done by Google and Ipsos OTX MediaCT, low percentage of smartphone users were observed in the bus stop area. The study asserted that waiting in line recorded the highest percentage with 59% among types of activities conducted while using Internet on Smartphone. However only 20% of the space users were engaged with their smartphones. Even those who used their phones were decently attentive to the surrounding environment. As people are waiting for the buses, they frequently looked out for approaching busses.

Another prominent behavior in the space was listening to something, using headphones. This behavior seemed to be a way to escape from the uncomfortable aural experience.

Figure 2-15. Photograph of space users at Mechanics Pine St & Davis Bus Stop

ANALYSIS

The comparison of the pattern of sensory priority and the percentage of people using their smartphone in five different places reveals that the hypothesis of the research is false. The two different colors on the sensory notation charts differentiate places in terms of sensory quality. The pink indicates calm and enjoyable environment while green color means uncomfortable and moderate surroundings. Although the low percentage of smartphone use was expected for those sites with pink notation charts, two study sites with pleasant sensory experience mark the highest and the lowest percentage; 90 percent of the space users in the Ferry Building Waterfront Area was engaged with their smartphones and less than 5 percent of people in the Portsmouth Plaza was spending their time in the cyberspace. On the contrary, places with green notation chart display third highest and second lowest smartphone use percentage as shown in the charts layout (Fig.3-1) from highest percentage to lowest.
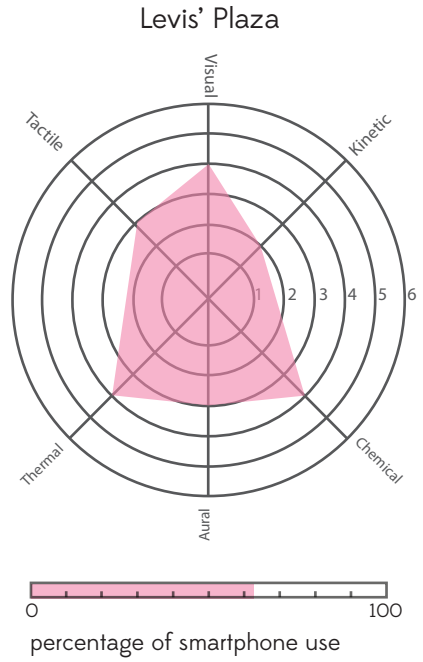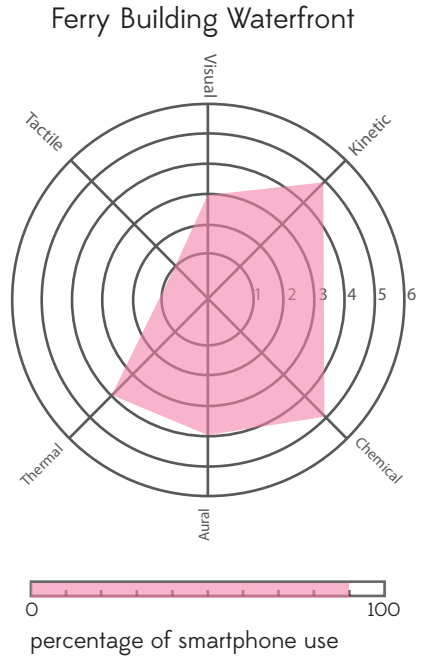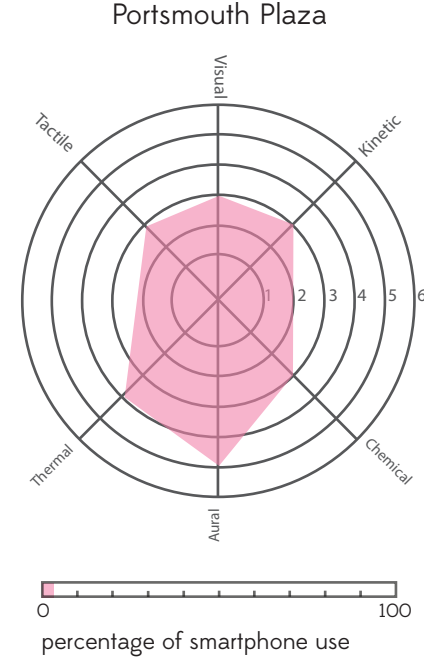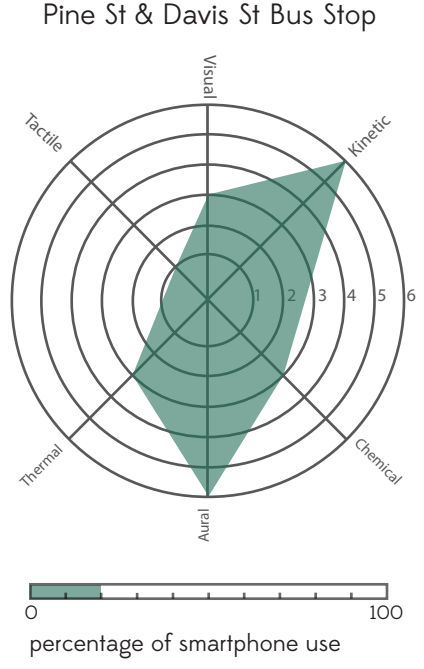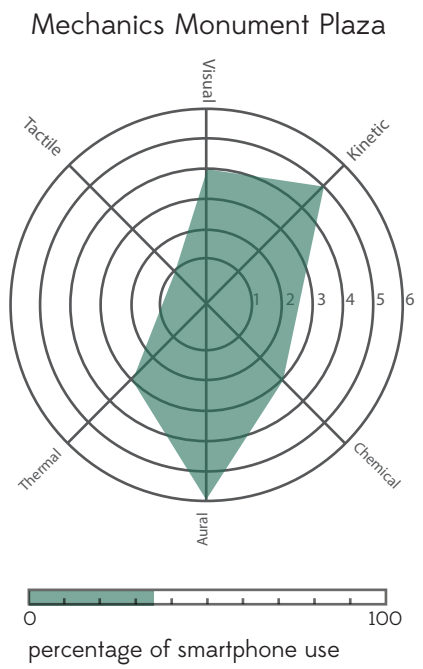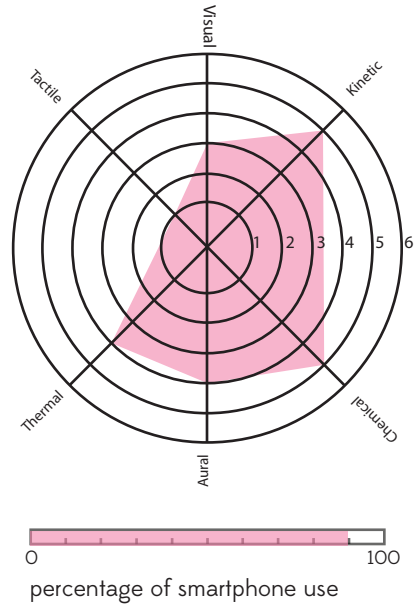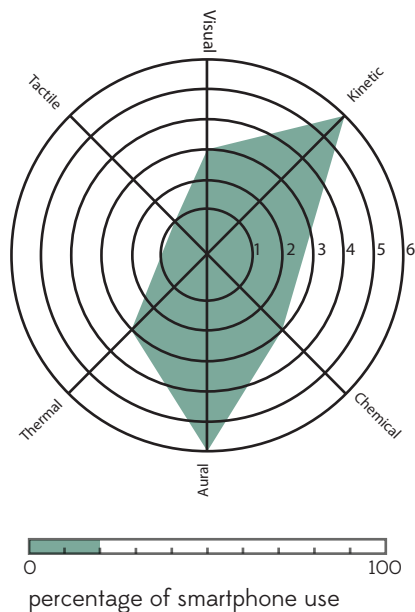
Figure 3-1. Chart layout from the highest percentage of smartphone use to the lowest percentage.

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a. Ferry Building Waterfront

percentage of smartphone use

b. Pine St & Davis St Bus Stop

percentage of smartphone use

c. Portsmouth Plaza

percentage of smartphone use
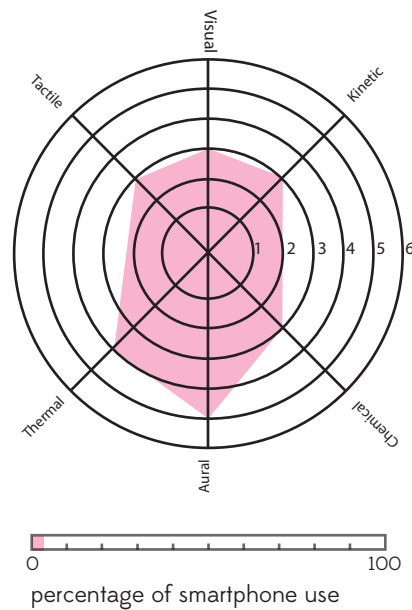
The Portsmouth Plaza, located in the China Town, is occupied by Chinese elders range between 50 to 70 years old while the younger generation people who are more technologically knowledgeable used the Waterfront area. Among 50 people in the Portsmouth Plaza, only few passersby who seemingly do not belong to the place were engaged in their smartphones. However, 90% of people in the Ferry Building waterfront spent their own time with smartphone. This contradicting smartphone use level can be explained by the fact that the generation gap creates different level of individuals' attachment to their smartphone. Younger generation not only has better knowledge about the smartphone but also maintains their relationships with other people through the cyberspace, spending time on displaying themselves and sharing daily life in the virtual society. On the other hand, the elders are slow at adopting new technologies.

In addition, the specific culture of the Chinese elders partially influenced the lowest smartphone use. As opposed to individualistic culture of America, older generation people grown up in Chinese culture have strong sense of community within their neighborhood, gathering in groups in regular base and sharing their interests. The active interaction between individuals eliminates the possibility of spending time alone and looking for other source of interaction or entertainment in the cyberspace, resulting in

Figure 3-2. Chart layout for comparison

their low engagement with the smartphones. Hence, it is evident that characteristics of space users influence the level of smartphone uses in public spaces, rather than the sensory aspect of the space.

The analysis between chart b and c concurs that there is no correlation between the quality of sensory experience and the level of smartphone use. Two places with the opposite sensory quality and priority pattern resulted in a similar level of smartphone use. The chart b represents a green narrow polygon, which indicates an uncomfortable and imbalanced sensory experience. The constant pedestrian movement within the narrow sidewalk and the heavy vehicular traffic in the facing road produce the dominance of the kinetic and aural elements. On the contrary, a wider polygon in pink color demonstrates a pleasant and balanced sensory experience. Surrounded by rows of trees and the sloped grass area, the plaza provides a calm and cozy environment. Although both places resulted in the low level of smartphone use, different factors contributed to the result. As explained in the comparison between the chart a and c, the major influence for the level of smartphone in the Portsmouth Plaza is the specific demography and culture of Chinese elders. In case of Pine St & Davis St Bus Stop, the factor is more situational. The demography of space users was young

and old professionals working in the financial districts. These people were attentive to the surroundings, as they anticipated arrivals of buses they are waiting for. Therefore, this investigation explicitly explains that the situational condition of individuals is more influential to the level of smartphone use in public spaces instead of the characteristic of surrounding environment.

DESIGN INVESTIGATION

The design investigation introduces three different urban interventions as responses to the findings of the research. According to the analysis, there was no clear correlation between the sensory quality of a space and the level of smartphone use. It is clear that the cultural, generational or situational factors are rather affecting the smartphone use in the public spaces. Therefore, inducing changes in people's behavior is more effective approach than suggesting modification of the space to achieve the initial goal of the research - restoring the connection between people and the surrounding environment through sensory experience.

Design Concept

The design approach copes with individuals' excessive smartphone use by inducing the temporal surrender of the smartphone possession as an exchange with the opportunity to perceive and engage in the surrounding environment. Each intervention requires people to be physically separated from their smartphoneS in order to obtain various incentives: comfort, battery life and recreation.
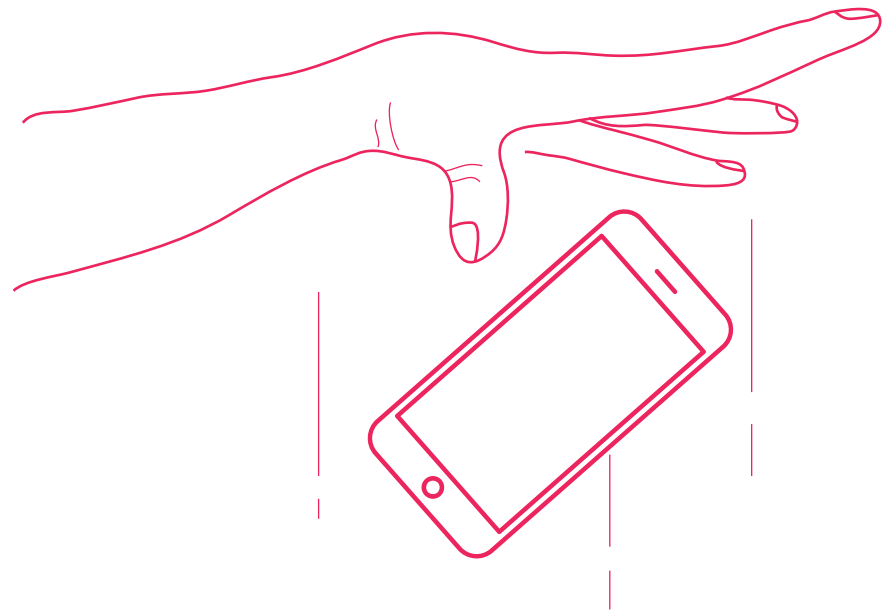
INTERVENTION 1 : Blow Up

TARGETED SCALE: STREETSCAPE, BUS STOPS

The "Blow Up" encourages people to give up their smartphone possession by providing the comfort as the incentive. Once the users plug in their smartphones, the air station, powered by the battery of smartphones, pumps the inflatable couche. When the smartphone is disconnected, the couch slowly flattens. This intervention is apt for streets and bus stops where people spend most of their time standing and waiting for the buses. It suggests comfortable sitting or lying poses to people in order to introduce unordinary ways to look at the surroundings.

GIVE   &   TAKE   ACHIVEMENT
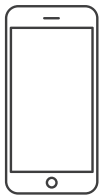
Smartphone

&

Battery

COMFORT

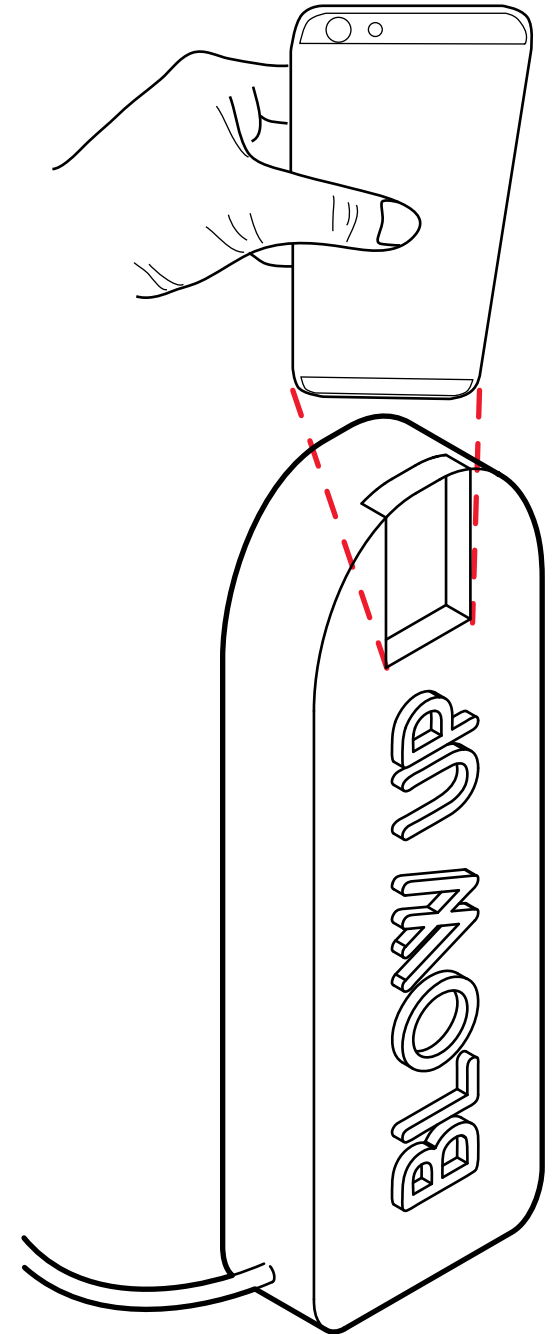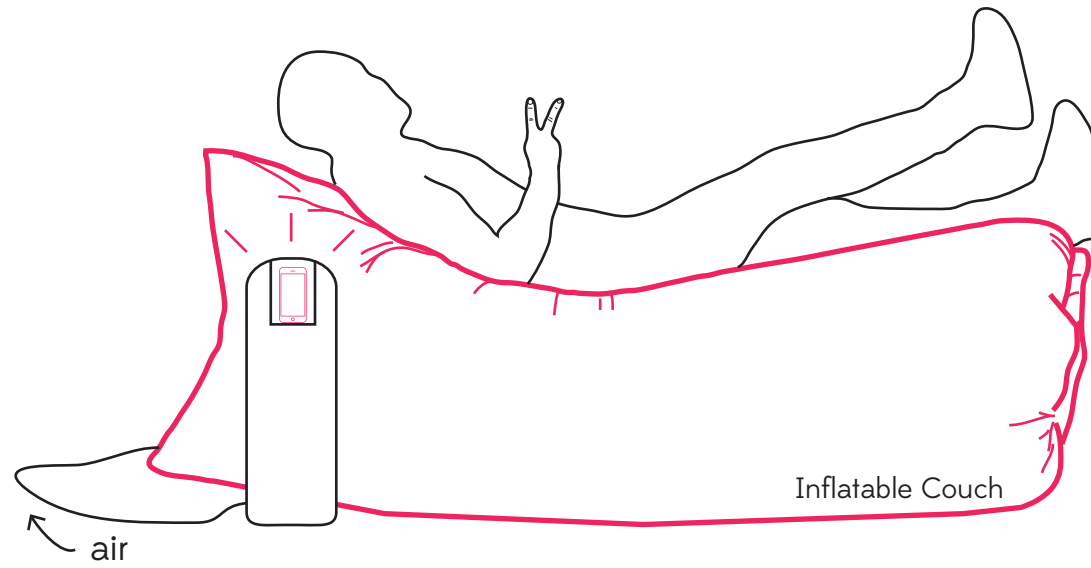Time to percieve and interact with surrounding environmnet

Tactile stimulus

Figure 4-1. Concept digaram of "Blow Up Your Mind"

Before Participation

While Participation

Inflatable Couch

air

Figure 4-2. Illustration of "Blow Up Your Mind" use

Figure 4-3. Photo collage of "Blow Up Your Mind"

INTERVENTION 2 : Charge Yourself

The "Charge Yourself" invites people to sit on a swing while the swing generates energy to charge their phones. This concept is opposite of the first intervention in a sense that the users are earning the battery as the incentive. Unlike other energy-generative equipment, gentle and slow movement of a swing is a suitable device to suggest a new and enjoyable perspective to the immediate surroundings.
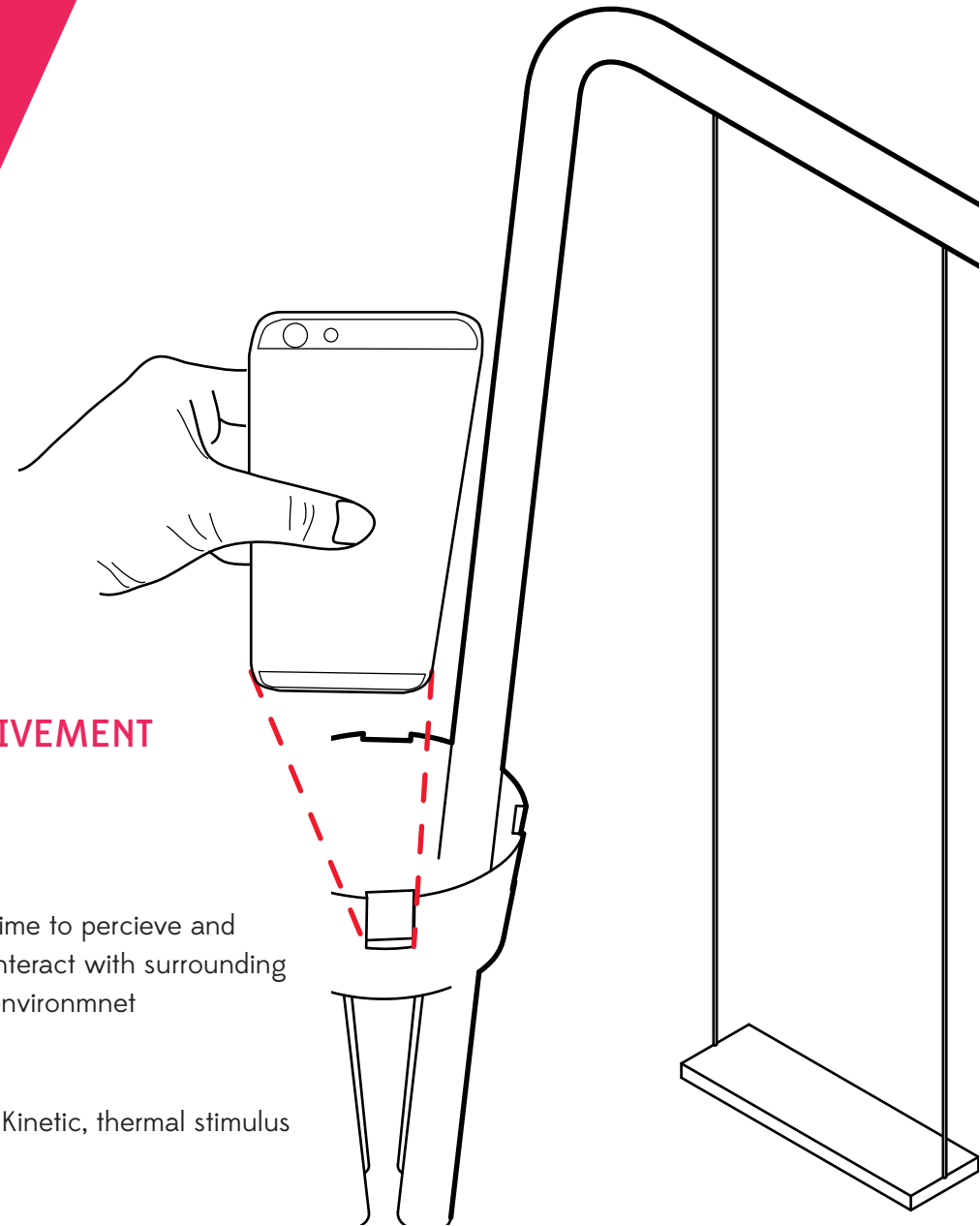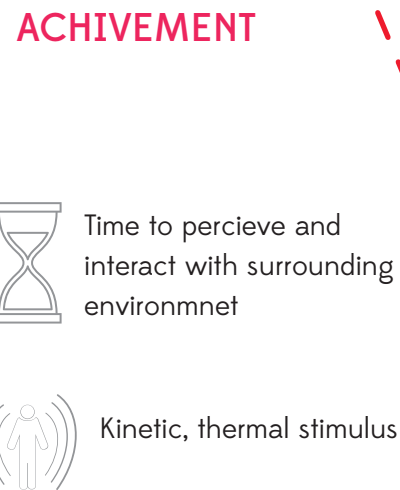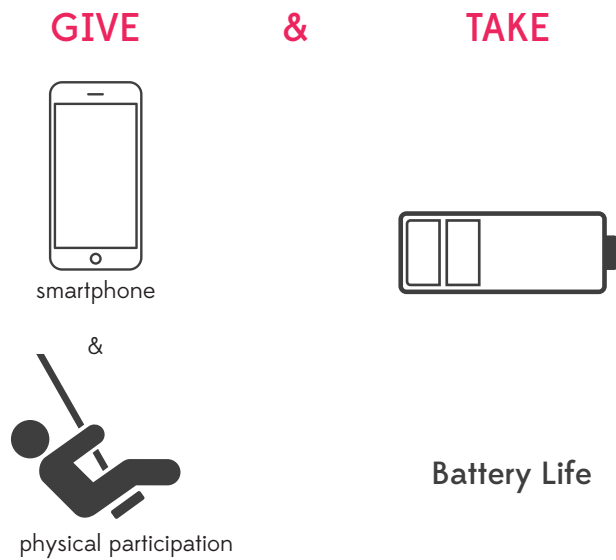
GIVE   &   TAKE   ACHIVEMENT

smartphone

&

physical participation

Battery Life

Time to percieve and interact with surrounding environmnet

Kinetic, thermal stimulus

Figure 4-4. Concept digaram of "Charge Yourself"

32
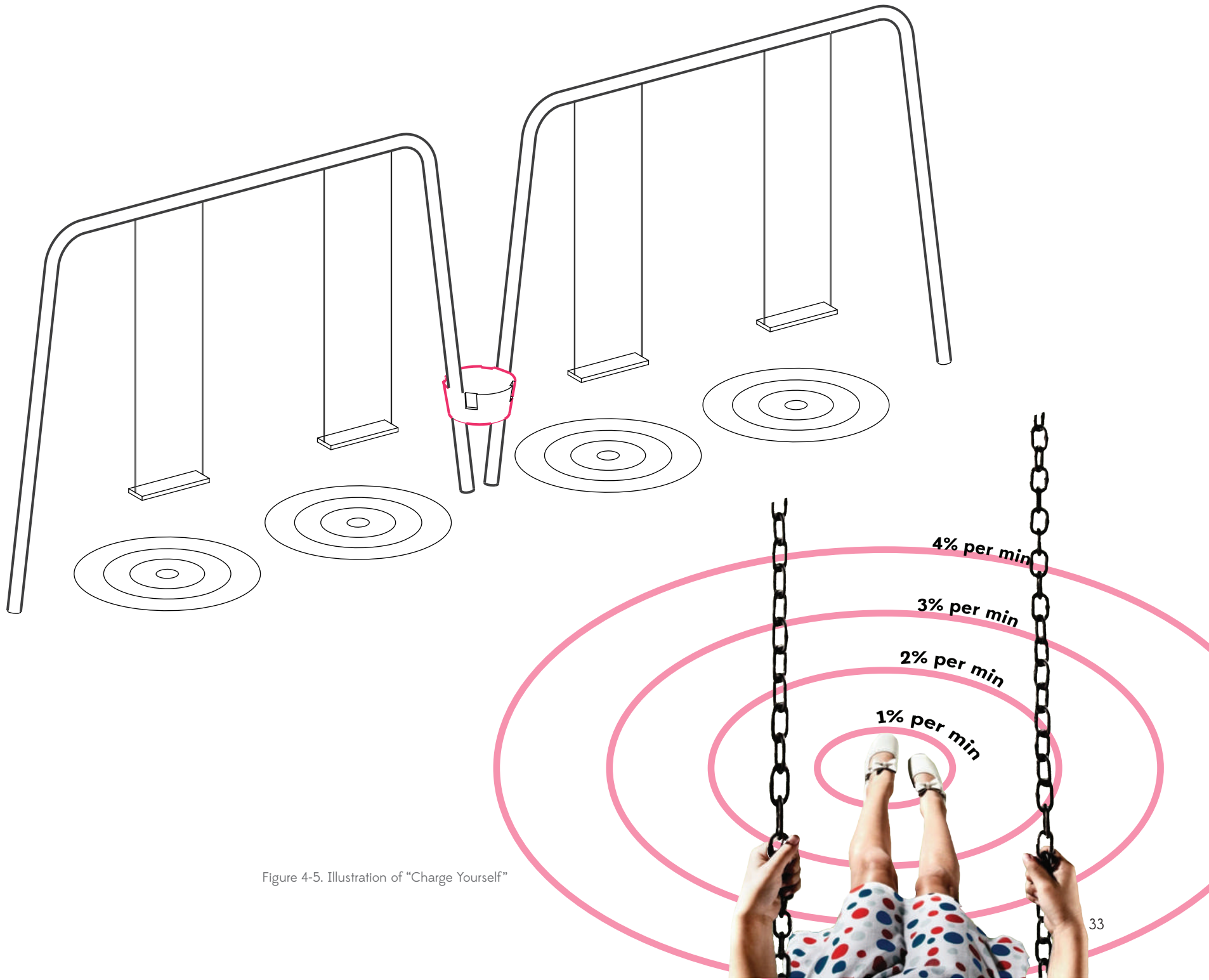
Figure 4-5. Illustration of "Charge Yourself"

4% per min

3% per min

2% per min

1% per min

Figure 4-6. Photo collage of "Charge Yourslef"

INTERVENTION 3 : Rest In Peace

TARGETED SCALE: PARK

The "Rest In Peace" suggests another way of inducing people to give up their phone while spending time in a public space. In order to initiate a fountain, certain number of people needs to give up the possession of their smartphone by connecting them to the stations. The locations of small stations are spread throughout the park. This intervention encourages people's action through cooperation for a common goal. By incorporating a water feature, this approach aims to stimulate and to improve the aural, tactile, thermal and visual experience.
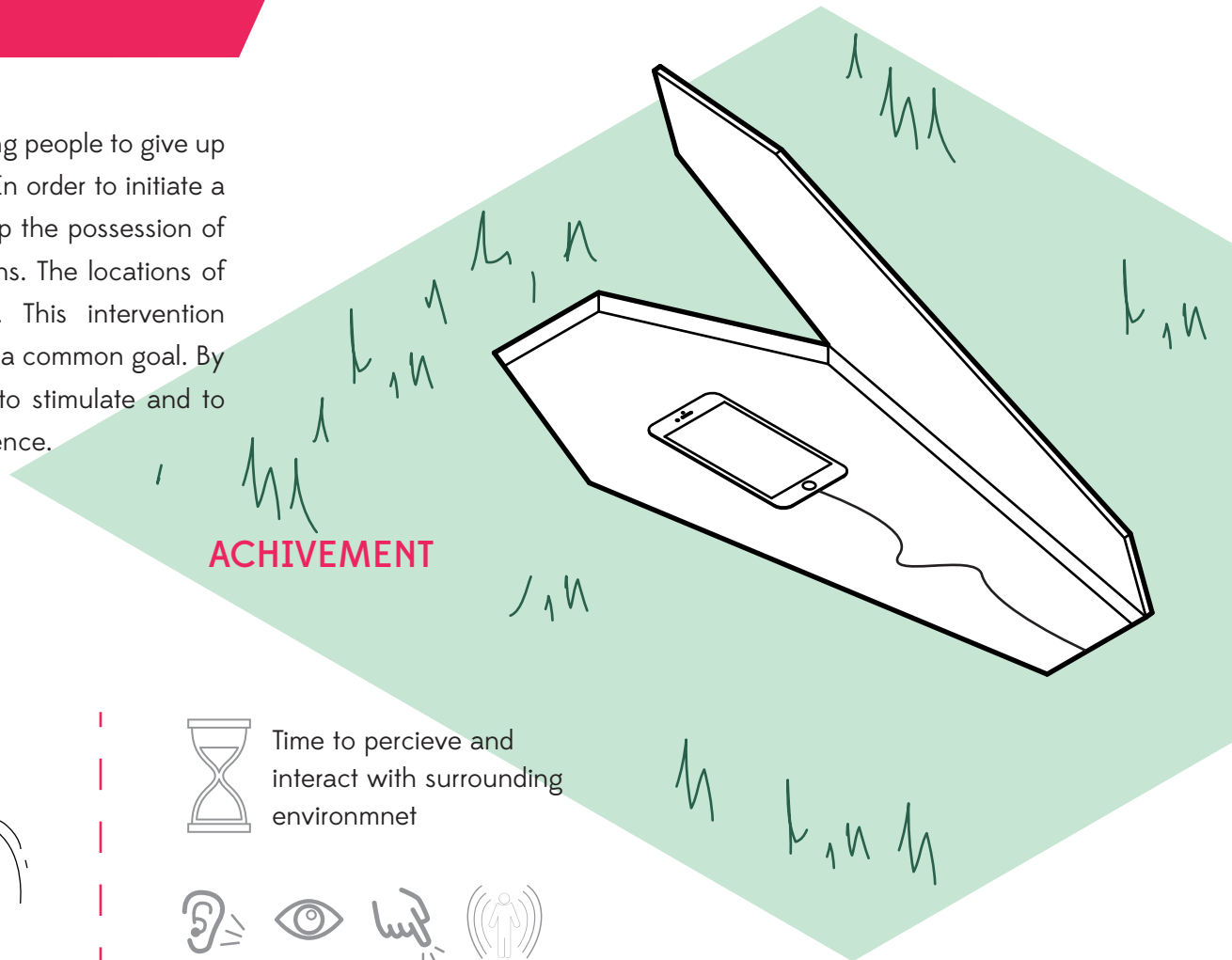

GIVE   &   TAKE   ACHIVEMENT

smartphone

&

Cooperation

Fountain

Time to percieve and interact with surrounding environmnet

Aural,   Visual,   Tactile, Thermal stimuli
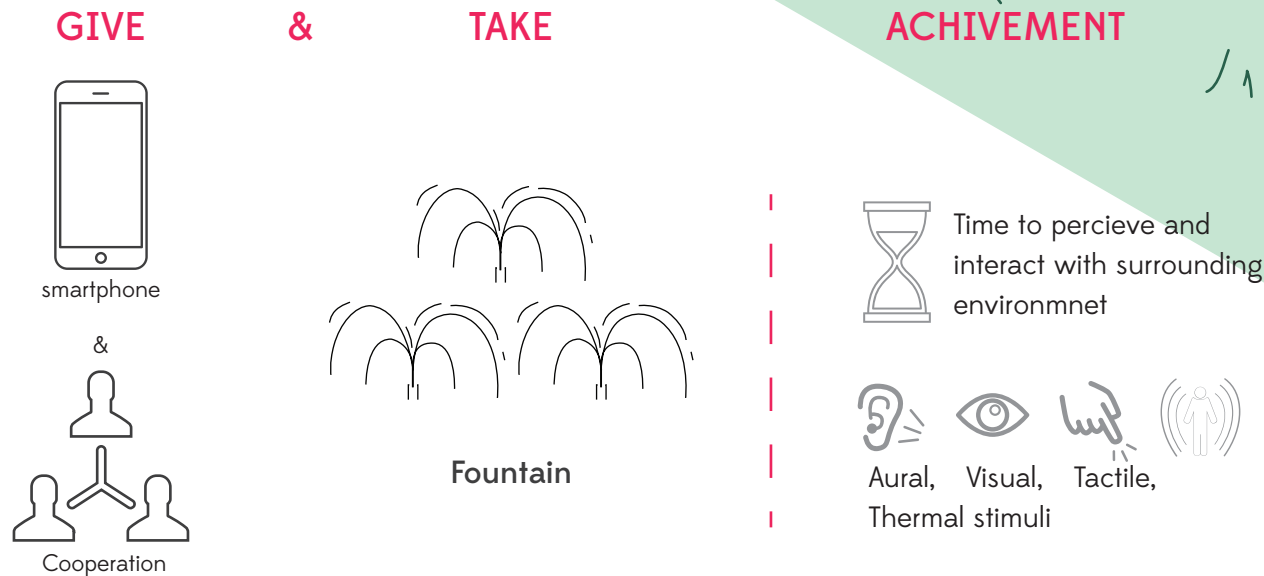
Figure 4-7. Concept digaram of "Rest In Peace"   35

Figure 4-8. Photo collage of
"Rest In Peace"

Figure 4-9. Photo collage of "Rest In Peace" in use

Figure 4-10. Photo collage [Fountain View] of "Rest In Peace" in use

CONCLUSION & REFLECTION

The research on the relationship between the spatial quality of a place and the level of smartphone use in the place revealed that there is no correlation between two aspects, and it signified that the problem of the compulsive use of smartphone related to social and psychological factors: culture, age and situation. These social factors will be continuously affected by the rapid development of technology. The culture will evolve around new technology, accompanied by new concept of virtual space and time. Accordingly the advancement will continue to transform human's internal systems like the cognitive process. Therefore, we need to be aware of what physical and psychological changes technological development brings and responding with the critical perspective towards transformations. This subjective attitude will promote the experiences that make a human human.

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