DRAMA, STORY, PRODUCTION, INTERACTION:

A DESIGN APPROACH TOWARDS INTERACTIVE INSTALLATIONS

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Drama, Story, Production, Interaction: A Design Approach towards Interactive Installations

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PROEFSCHRIFT

ter verkrijging van de graad van doctor aan de Technische Universiteit Eindhoven, op gezag van de rector magnificus prof.dr.ir. F.P.T. Baaijens, voor een commissie aangewezen door het College voor Promoties, in het openbaar te verdedigen op woensday 28 juni 2017 om 16:00 uur

door

Yu Zhang

geboren te Jiangsu, China

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This work is dedicated to a boy.

"唉 祝我们的祖国繁荣富强吧
唉 让我们的领导永垂不朽啊
唉 祝我们的爱人万寿无疆吧
唉 让我们的青春坚强不倒啊"
 - 李志《青春》

好吧。那就让我们开始吧。

Contents

triangle dripping into ocean (2016)

*30*35cm*
oil on canvas

CHAPTER 0
INTRODUTION

"Now if you have a big tree and are at a loss what to do with it, why not plant it in the village of nowhere, in the great wilds, where you might loiter idly by its side, and lie down in blissful repose beneath its shade? There it would be safe from the axe and from all other injury. For being of no use to others, what could worry its mind?" (p.220, Melvyn, 2012)

- Chuang Tzu

0.1   Enlightenment

For Chinese poet Xu Zhimo, Florence was a mysterious place infused with grief and beauty. In the summer of 2013, I stayed in Florence for a couple of days. I was overwhelmed by endless visitors, overrated restaurants, and lands of cheap souvenirs. I wondered throughout the trip if the Florence in the poem only existed within the poem. One day, at noon, after queuing outside of the Uffizi gallery for two and a half hours - thirsty, tired, and out of patience - finally I could go inside. I followed the groups of noisy and sweaty tourists going through each exhibition hall. When I was moving on the third floor and entering one of the rooms, it was as if my heart suddenly stopped - I could not hear anything at that particular moment and the crowds of people moved far ahead, out of my sight. This was the room of Botticelli's art (Figure 0.1, left). Botticelli's paintings hung on the wall. Mars and Venus were standing on his paintings, gently looking down on me. It was as if my body was forced to bow backwards. I returned in the next morning, around half past eight. I was the first person to enter the Uffizi. I ran to the third floor - Botticelli's room. The whole room was empty, the soft morning sunshine went through the narrow windows, dust dancing in the light, and those paintings became alive. Tears quickly wet my eyelashes. I seemed to hear the voice of singing coming from far away floating through the air. I suddenly could understand the grief and beauty of the Florence that poet Xu Zhimo described. This experience left a strong echo in my life for years: at thirty-five past eight, on July 25th, in 2013, that was the moment I felt my heart was pierced, bitter-sweet, by these static pieces of Botticelli's collection. The similar experiences have occurred several times later on in my life. When I was standing in front of the artworks, the physical proximity overstepped the boundary of my expectations for art and caused a sea change within me. I was moved deeply when I was climbing the stairs of the British Pavilion in the fifty-sixth Venice Biennale, and I was defenseless

Figure 0.1: Left: Botticelli room at Uffizi Gallery in Florence. Right: *The Seven Heavenly Palaces* by German artist Anselm Kiefer was in Pirelli HangarBicocca in Milan.

for the power of Sarah Lucas's large-scale body sculptures - sexual, comedic, and majestic (Lucas, 2015). I was moved deeply when I saw dramatic reflections of myself around a mirrored space in Yayoi Kusama's *Gleaming Lights of the Souls* in the Louisiana Museum of Modern Art (Kusama, 2016). I was moved deeply when I walked through *The Seven Heavenly Palaces* in Pirelli HangarBicocca (Kiefer, 2016), "*in wich all men would lose their way*" (Oancea, 2016) (Figure 0.1, right).

I think of these experiences as examples when people asked me what the power of an artwork could be. I also describe these as examples when people asked me how an artwork can impact its audience. These experiences created the moment surpassed my expectations; the moment when something immediately captured my heart and arrested my thought; the moment when something reminded me of the earliest memories. Something was turning these experiences into a mixture of time and space. Something was holding on to these experiences as more than the experience. However, what is this something? Does this something exist for everyone? How do others look at this particular something? Are they feeling the same as me? At least I know this something is cultivated through the experience of the work of art, not just staying on a flat and still color-splattered canvas.

A work of art may not need to be defined as an objective phenomenon independent of reference to particular people (Detar, 2007). It also seems impossible for people to view something entirely objective and similar - that is, people are not capable of experiencing the world without personal interpretation (Nørretranders, 1991). Once it is out of their hands, artists have no control over the way a spectator will perceive the work. Therefore, should artists speak to the audience in a language that they can understand? If so, how can one create an artistic language that surpasses the value of different interpretations? These seem to underline the importance of "people" for artists.

Since the early pioneers like Le Corbusier in collaboration with the Philips Corporation designed *Poème électronique* in 1958, artists have embraced interaction and interactive technologies as means for expressing their objective concepts. Consequently, designing the experience for interactive artworks has gained attraction worldwide over the last decades. Any innovative design is strongly influenced by the intents of the practitioners[1] including designers and artists. It is of utmost importance to understand how those practitioners'

1 In this thesis, "practitioners" is used to include bother designers and artists, later it may also include design students in their project practice.

intents can be made explicit through their designed artifacts.

Carrying with me these experiences and questions, I started my four-year PhD. My ongoing interest in developing an art piece with interaction ultimately led me to interactive art where "people" become the true object or subject of an artwork. In traditional artworks, a painter might not explicitly consider "people" at all, but considering the properties of the paint - the colours and the forms constructed with them. In interactive artworks, "people" are becoming strangely physical. "People" are placed into a perspective by the way the practitioners practice their work. Art, considered in the context of interaction relies specifically on the fact that its uniqueness is able to manifest the experience of "people" only in the here and now, necessitating the physical actions of "people", and manipulating their sensory encounters. The experiences of "people" then will showcase their own creative expressions and interpretations. The experiences in interactive art are not only about perceiving the object but also involving dynamic movements and activities (Rokeby, 1998).

In the remainder of this chapter, I describe interactive art in a broader sense of that art practice is coexistent with audience experience (section 0.2). Several theatrical theories and principles lead me to address the interesting theatrical elements which might inspire the practitioners to involve the audience experience into their practices when designing an interactive art installation (section 0.3.1). Project *ALONE ALONG* (section 0.3.2) was an endeavour to connect these theoretical findings with the practice. The result of section 0.3 underlines that performance art more works with spatial experience and dynamic dialogues between performer and audience. Performance art might be more related to the assorted forms of the artist-audience relationship in interactive art.

0.2 Foundation: Interactive Art

Take one piece from my experience at Lyon Festival of Lights in 2014. As one of the few interactive installations, *Axial@Fête des Lumières* (Playmodes, 2015) created an interactive epxerience for the audience. Based on a Leap Motion sensor, it allowed the recognition of finger poses in four different interactive modes. To experience this interactive installation, I opted to be just a spectator at the beginning. I wondered why the dynamics of sonification and visualisation sometimes were smooth and sometimes had a pause

with no reason. After a while, I went to the interactive stage which was a small room at the end of the installation space. In that small room, I tried different interactive modes, and the Leap Motion sensor had certain problems to react in time to my finger poses. There were delays between what I did and how the interactive system reacted, which might explain the pause and chaos in the experience as a spectator. In this case, from the perspective of an art practice, this large-scale installation with an interactive system was very well staged and organised. What this interactive installation did exploited a place and a condition of its own. It innovated and flourished in the context of Lyon Festival of Lights. However, from the perspective of audience experience, being a participant and being a spectator had to move into two different spaces which led to a rupture in connectivity. Also, the erratic movements in the Leap Motion sensing area caused the images to pause, chaos, and confusion in my experience. If certain uncomfortable experiences such as confusion or conflict were intended, I fully accept that. In the end, my experience (no matter whether I felt it was smooth or not) became part of *Axial@Fête des Lumières*. The experience I went through in *Axial@Fête des Lumières* was undertaken by spectator-participant initiating, updating and extending a dynamic process in which factors such as forms, technologies, spatial arrangements, social and cultural components were involved. I conclude that an interactive installation cannot purely rely on aesthetics, poetics, or style. Practitioners must perceive the intent that is anchored in their interactive works in the light of today's experience.

In light of the factors and the conditions involved in the experiences of an interactive artwork, from the perspective of art practice, artists and designers are working on the basic input, creation and the dynamically changeable output (Kluszczynski, 2010). Art critic Michael Rush defines interactive art as "*forms of interaction with computer technology, often on a large scale, that are truly participatory*" (p.222, Rush, 2005). His perspective explains that both computer technology and the physical interface play important roles in the creation of an interactive artwork which determine the scale of interaction and impact audience's engagement (Rush, 2005). In line with Nam (2014), I emphasise the definition by Rush that with the help of digital technology and a physical interface, an interactive artwork is defined in terms of the scale of interaction, reconfigured space, and engagement with the audience.

On the other hand, from the perspective of audience experience, a strong focus on audience participation is found in the research field

of interactive art (Costello et al., 2005). Regardless of what shape the final art piece of an artist's activity takes on, participative behaviours grow and give rise to the real and final formation of a creative work of interactive art (Kluszczynski, 2010). This research makes the audience visible and provided a detailed account of how forms of interactive experience manifest themselves in interactive artworks.

As discussed there might be a certain disconnect between art practice and audience experience. I would like to think of an interactive artwork as a seesaw: the individual audience or the audience as a community is sitting on one side of a seesaw and the practitioner is sitting on another. The force on each side of this seesaw is shifting. How does the force transformation pose to both the audience and the practitioner related to the artwork itself and its experience? The main objective of the following section is to explore new opportunities in the context of audience experience in interactive art practice. The theories and techniques from the traditional theatre are my first step to explore how to present the experience of a real activity in front of people in a specific place when creating an interactive installation.

0.3 Exploring the Foundation: Traditional Theatre as a Starting Point[2]

In the winter of 2012, I experienced Light Festival GLOW in Eindhoven. A particular set of those lighting installations had vast steel-frame structures. By running their programs, they were like shining and lonely giants performing on the stage, as charismatic as I'd never imagined. People consumed every performance of one installation and moved to the next. They glanced around, they laughed, they touched, they talked, in the end, they left, and a new group of people came and did the same thing again. What artists and designers created and returned to people was a concrete situation where setting each experience, even when people isolated themselves from talking, touching, or playing. In the night, after thousands of people were streaming out of the festival and the installations finished their performing day by being unplugged. Their gloomy silhouettes in pitch blackness seemed like a cluttered backstage where the performers had already gone.

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2 This section is based on: Zhang, Y., Gu, J., Hu, J., Frens, J.W., Funk, M., Kang, K., Dong, Q., Wang, Y., Wang, F. &Rauterberg, G.W.M. (2013). Learning from traditional dynamic arts: elements for interaction design. In proceedings of the 4th International Conference on Culture and Computing-ICCC 2013, 16-18 September 2013, Kyoto, Japan (pp. 165-166).

In this experience, my understandings of the stage-set space, the performer-audience relationship, and the environmental atmosphere emerged. This understanding gave me probes to examine interactive installations from the theatrical perspective. This was a pivotal moment where I started to think of the relevance of experience in interactive art and experience in theatre.

Art pieces are trained by artists with the techniques of acting "*from the time-lapse between inner impulse and outer reaction*" (p.20, Grotowski, 2012). The long history of theatre has much to offer to the field of interaction design as Brenda Laurel noted as far back as 1992. There are several ways of looking at how theatrical theories and techniques offer new perspectives for creating interactive installations (Dalsgaard et al., 2008; Laurel, 2013; Raijmakers et al., 2006). Laurel (2013) attempts to provide new possibilities of interaction based on theatrical theory. She emphasises the technological aspects of dramatic theatre plays, like adding sound, colour, motion and the role of spectators. With regard to the roles of participants or users of an interactive system, Dalsgaard and Hansen (2008) divide them into operators, performers and spectators based on the performance (theatre) theory, phenomenology, and sociology. They address the existence of re-identified concepts of the performative spectator and the spectating performer and argue that the user is simultaneously a 3-in-1 role contently shaping ones understanding and perception of the interaction. Raijmakers et al. (2006) choose documentary films to inspire design research in Human-Computer Interaction (HCI), despite not identifying theories and techniques from the traditional theatre as an inspiration for interactive installations. Shyba et al. (p.2, 2005) explore key points of "*conceptual convergence between theatre art and human-computer interaction design*" and implement their new method into the workshop curriculums.

In interactive artworks, the experience is built on forms of interaction in which interaction serves as a means to access content (Schraffenberger et al., 2011). In section 0.3.1-0.3.2, I will identify a preliminary list of theatrical elements based on the literature review mentioned above that I found useful for designing interactive experience, followed by a case study that shows how these elements were applied in the installation *ALONE ALONG* (Gu et al., 2012).

0.3.1 Elements from Traditional Theatre

(1) Shifting roles in the theatre: operators, performers, and spectators

In theatre practice, the proper performer-audience relationship is built based on the types of performance (e.g., drama, acoustic/unamplified music, opera, or dance) and their physical arrangements (e.g., arena, end stage, or flexible/environmental/promenade theatre). The transformation of the performer-audience relationship relies on shifting roles within traditional theatre: "*the actors can play among the spectators, directly contacting the audience and giving it a passive role in the drama. Or the actors may build structures among the spectators and thus include them in the architecture of action, subjecting them to a sense of the pressure and congestion and limitation of space. Or the actors may play among the spectators and ignore them, looking through them. The spectators may be separated from the actors - for example, by a high fence, over which only their heads protrude; from this radically slanted perspective, they look down on the actors as if watching animals in a ring, or like medical students watching an operation (also, this detached, downward viewing gives the action a sense of moral transgression)*" (p.20, Grotowski, 2012). To participate in an interactive experience, especially when this participation comes to public spaces, it becomes about perception and the observation of another's experience (Dalsgaard et al., 2008). The participant of an interactive installation can always be more than a passive user. Participating in creating (Hu et al., 2013) and interacting (Wang et al., 2011) with an interactive installation is about transforming roles between the roles of operator, performer, and spectator at certain moments (Jacucci, 2015). For example, participants that are both operating and performing, and one is also a spectator of actions of the others. Once spectators are placed in an illuminated zone, or become visible, they too begin to be a part of the performance and play a role in the performance (Grotowski, 2012).

(2) Foreground, mid-ground, and background

I treat these three grounds as way to focus concentration and shift attention that appears on the theatre stage. These three grounds refer to the dominance in the theatre that are distinguished by physical arrangements (Malloy, 2014). Light management, for example, as one of the techniques in theatre performance, reveals a wide range

of possibilities for the performer (Reeves et al., 2005). By working with light sources, different sizes and positions of shadows and bright spots mediate dominance and attention to the stage. These techniques manage the attention of the audience in the traditional theatre and can also be effective for the design of interactive art installations. To garner the attention of the public is usually a challenging task especially when the installation is surrounded by crowded and busy elements in an open space. Dividing the noisy and distracting surroundings of an interactive installation into foreground, mid-ground, and background, the installation can garner the attention from the audience in this complicated context and compel the audience experience.

(3)   Front stage and backstage in time and in space

In theatre, the stage is referred as the area in which the performance takes place. Front and back stages are divided by, on the one hand, the function: performing on the front stage and preparations for performing happened on the backstage; on the other hand, they are divided by the behaviours: front stage behaviours are actions that occur for the audience. Backstage behaviours occur out of sight of the audience (Goffman, 2002). In interactive artworks, some artists and designers try to open the backstage to the audience as well. The meta-level of this, mixes observation with participation which varies the reception of an interactive installation according to how much individual audience knows about, or cares about, what is going on and why it happens here. Three interactive installations in the *Notion Motion* exhibition by Olafur Eliasson (2016) (Figure 0.2) used their appearances on the front stage to manage their acting

Figure 0.2: *Notion Motion* in Museum Boijmans Van Beuningen in Rotterdam in 2016. This photo shows the backstage where the making happened, exposed openly and explicitly to the audience actually before they see the real artwork. (photo by Hans Wilschut)

and gave the impression that Eliasson sought to make. Meanwhile, the backstage continued unfolding the experience over time. When I was standing in this exhibition, what happened on the backstage complemented my perceptions of what I saw on the front stage: I was able to know what was going on, why it happened and how it happened. Front/back stages in interactive installations that can be a two-fold experience: "*The first is the stimulation to imagination and emotion that is created by carefully crafted uncertainty. The second is the satisfaction provided by closure when the play is completed if the plot has been successfully constructed.*" (p.79, Laurel, 2013)

(4)   Use of dramatic languages

Language in the traditional theatre is the spoken, chanted or sung words in the theatre. It can also be non-verbal such as body language (French et al., 2015). The means of the language used in the theatre realise the information in the performance (Féral et al., 2002). The purpose of using languages is much the same in interactive artworks and theatre performance. Languages used in interactive artworks translate the content into experiences sometimes beyond the conventional audiovisual forms. The use of dramatic languages channels the content into presenting and achieving the given goals during experiences. For example, haptic or olfactory cues playing with the functions of language deliver the information to the audience by touching, smelling and feeling in an installation.

(5)   Tension

Tension is about undertaking and maintaining an audience's involvement in a performance. It is closely linked with timing. Planting curiosity and expectation, serving the information and the inference, and creating conflict are methods to build up the tension and engage the audience. One of the patterns of building up tension in a theatre performance is gradually starting, until the climax, and then offers released. However, in the experiences with interactive installations, there might not be such clear boundaries. Dynamic interaction mixes peaks and valleys (Laurel, 2013). Thereby, the practitioners are able to offer a more layered experience contained within the tension of the interactive installations. Moreover, the audience as the participant is able to decide about the order of the tensions.

Next, the interactive installation *ALONE ALONG* is presented followed by a discussion about how five elements from the traditional theatre were explored in one student group's work progress. Examining the terms that helped them compose and design the interactive experience. The use of theatrical elements in this work made it possible for me to investigate the results of bringing theories and techniques from the traditional theatre into interactive installations.

0.3.2 ALONE ALONG

ALONE ALONG is an interactive installation with front projection onto the train window made of cardboard which is settled in an office environment in the context of Chinese culture and traditions. Chinese culture is sensitive for isolation and transient living situations (Kang et al., 2013). Due to geography and historical factors, train stations are associated to long farewells and reunions especially at the moment of leaving and approaching the platform. In contemporary China, the young people go far away to start their life and career in industrial zones and cities that are new to them. Although they are passionate about their new life, they can hardly beat their homesickness. The train station image becomes a metaphor that integrates the scenario and meaning in this situation. Therefore, the concept of *ALONE ALONG* started with a view of multiple copies of a digital train window in the corridors on different floors in an office building.

When composing the interactive experience in the design process of *ALONE ALONG*, the elements learned from the traditional theatre were applied. The audiovisual language was used to attract the participant's attention such as the background music and the different sets of sceneries (images). These images were projected on the digital train windows that were played at different speeds from
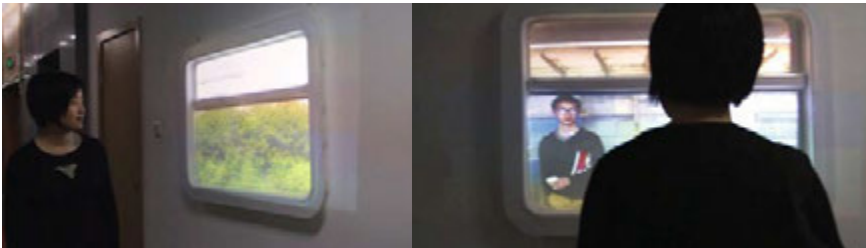
Figure 0.3: Interactive installation *ALONE ALONG*. Left: Participant passing by the train window. Right: Participant is interacting with her colleague appearing in the train window. (photos by Kai Kang and Jing Gu)

the fast-moving landscapes and would to slow down to indicate the arrival platforms of a train station. For this student group, playing with the speed of projected images was a strategy to build up the tension and offer indication of when the interaction would start. The student group assumed the corridor where the interaction happened was the front stage and the office where the interaction stopped was the backstage. This participant's experiences on two stages were expected to be different - from being stressful on the backstage to being surprised and delighted on the front stage.

During the experience, the participant was moving from her office (the backstage) to the corridor (the front stage) (Figure 0.3, left). If there were two people passing by the windows at the same time on different floors, they were able to see each other and might interact with each other, with either eye contacts or body gestures. Therefore, When the participant was on the front stage (the corridor), she was at the beginning a spectator. She watched the images in the train window on the wall that was a pre-set video of fasting moving landscapes. Then she became a performer when she started interacting with the images by walking faster or slower and by stopping in front of the train window. When she saw her colleague appearing on the scene (Figure 0.3, right), she waved to him and expected him to wave back - she became a protagonist to influence the behaviours of the others. This role-changing process shaped her interactive experience in a richer and a subtle manner. In this work, the corridor, where the participant performed, was the foreground. The colleague appearing in the window was in the mid-ground. The landscape and the platform from the video were in the background. When this participant saw the colleague appearing in the train window, waving at each other was the interaction between foreground and mid-ground. At the same time, the mid-ground became the foreground for the participant. The intertwined views between different grounds, offered the opportunity and perspective for this student group to tweak and tinker with their ideas and concepts.

0.3.3 Reflection

The intention of *ALONE ALONG* was to subject the audience experience in the using direct contact with the elements of traditional theatre. *ALONE ALONG* used interesting elements from traditional theatre, such as, setting performance and building the perform-er-audience relationship. It seems that theatrical techniques can be

applied to the design of experience in an interactive installation. Theatrical elements improved the visual composition in this project, and its experience indeed is deliberately making theatrical techniques out. *ALONE ALONG* achieves the goal of packing different theatrical techniques together. However, the manner in which *ALONE ALONG* attributes access via different theatrical techniques is controlled and there are no real choices offered to the audience in this interactive experience.

As what Brockett et al. (p.6, 2016) state, "*one reason for the varying responses can be found in theatre's range and diversity, both of which are evident in its three basic elements: what is performed (a play, scenario, or plan), the performance (including all of the processes involved in the creation and presentation of a production), and the audience (the perceivers). Each of these elements is essential and they affect not only each other but also the totality of what is expressed and how it may be perceived.*" The question of the appropriation of applying theatrical techniques into interactive art is delicate: we will see that several works make use of openness and therefore do achieve the complex levels of interactivity.

Figure 0.4 shows the similarities and differences between Zhengyici Peking Opera Theatre in Beijing and *The Weather Project* (Eliasson, 2003) in the Turbine Hall of Tate Modern in London. Both Zhengyici and *The Weather Project* have a similar spatial layout: a narrow and deep space. The space design, light effects and production settings in both situations produced the mood and immersive environment. However, the performer-audience relationship in this Peking opera theatre was that the performers totally ignored the audience. In this kind of traditional theatre, the question may be asked the audience

Figure 0.4: Left: Zhengyici Peking Opera Theatre. Right: *The Weather Project* by artist Olafur Eliasson in the Turbine Hall at Tate Modern in London in 2003.

is necessary for the performers and the performance. While in *The Weather Project*, the audience offered complexity in the given experience offered. An indoor space in which a big artificial sun appeared and surrounded by mist had a lasting effect on the scene because this phenomenon was unexpected. The light of this giant sun and the smell of the mist reacted with the participant's presence in this environment without influence of particular movements. Moreover, in *The Weather Project*, Olafur Eliasson installed a mirror covering the whole ceiling. The mirror drove the audience participation being a part of the artwork. That was why we saw the audience lying, sitting, swimming or dancing on the ground in the space. The difference roles what the audience took over in these two situations shows that it is crucial to work with the theatrical limits of interactivity rather than promoting a use of techniques in interactive art which might not lead to "*genuine interactivity - idealistic but unrealistic freedom of the spectator*" (p.255, Bouko, 2014).

The next step in this research is to investigate not only how every single theatrical element could be used, but also how to organise theatre elements into a clear framework and apply this framework to the process of expressing and perceiving in interactive installations. In addition, rather than the traditional theatre that effects an audience on a passive intellectual level, I also look into other platforms from performance which can rouse the audience and invoke change within them. "*'Open, synesthetic, and processual' elements of experience design can correspond directly to performance*" and "*performance tends to focus on those situations that closely parallel the interactions or experiences that an HCI practitioner or designer might recognize*" (p.8, p.31, Spence et al., 2013). For example, when comparing to the theatre and the use of spatial imagery, contemporary performance works more with spatial experience and variant performer-audience relationship which may be related more to the dynamic artist-audience relationship in interactive installations.

Acknowledgements

UNNAMED (2017)

4*5*3m
film/real time interactive performance

CHAPTER 1

RELEVANCE, RESEARCH QUESTION, FRAMEWORK, METHODOLOGY

"Watching the people who allow me to experience the exhibition through their eyes than can resynchronizes my vision a little bit so I can see what I have lost and it is interesting because obviously, I would like to think that I can predict to some extent what they see but the truth is I cannot. This is really amazing because I have a certain feeling of losing control also having given division of the expression to somebody else to stand next to a person and to put yourself in that person's place."

- Olafur Eliasson Interview: A Riverbed Inside the Museum (4:33min/42:14min, Louisiana Channel, 2014)

1.1   About this Chapter

Based on literature and examples from practice, the analysis of, and comparison between experience in performance art and experience in interactive art show that three relevant forms of negotiation exist. Practitioners who are new to designing interactive installations must acknowledge their limited experiences of negotiating with their audience (section 1.2). In response to this, the main research question of this thesis is: how can the practitioners design experience for interactive installations such that it relates their intent to their audience (section 1.3). To approach the research question, a new perspective on performance theory was formalised into the framework DSPI - *Drama*, *Story, Production*, *Interaction* shedding light on the design process and helping practitioners when negotiating with their audience (section 1.4). In section 1.5, this chapter moves to the methodology used in this research. The outline of the thesis is provided at the end of this chapter.

1.2   Performance Art and Interactive Art

Performance artists speak directly to the public in short-lived manners, and the audience is an active participant (Pecelli et al., 2012). Communicative signals appear between artists as performers and the audience as participants. Performance is intended to make the experience heightened and contemplative (Bell, 2008). Bauman defines performance by the degree of response as "*a mode of communicative display, in which the performer signals to an audience*" (p.9, Bauman, 2008). The collaborative participation in performance is a dynamic and interactive form (Nam et al., 2014) that involves experience in and through "*being, doing, knowing and creating*" (Dewey, 1934). A common field of interest among researchers in the field of interactive art is audience experience among interaction (Schraffenberger et al., 2011). Interactive art pieces incorporate both physical/digital platforms and artistic intent and build up experience via audience participation and intent transformation. Interactive installations involve the audience in completing or producing the work. Through audience's contributions via interacting with the artworks, the "*relationship between the artwork, artist, viewer, and environment*" (p.262, Edmonds et al., 2004) is continuously challenged (Nam et al., 2014; Rush, 2005). This relationship is blurred as: (1) the artist plays a role of a mediator or facilitator in his/her work instead of a sole creator (Bell et al., 2001); (2) the public or the audience becomes the components of the work (Paul et al.,

2003); and (3) "*artwork is often transformed into an open structure in process that relies on a constant flux of information and engages the viewer/participant in the way a performance might do.*" (p.606, Marcos et al., 2009)

Notably, the prevalence of experience appearing in performance art and interactive art already foreshadows a turn toward performance in art-based interaction design (Nam et al. 2014). This prevalence will be discussed using examples in the coming section. A summary of selected theories and examples provides the background for developing a suggestive framework for creating interactive art installations which will be described in the next section.

1.2.1 Experience in Performance Art

The installation *ALONE ALONG* offered a glimpse of exploring and applying theatrical elements in the development of an interactive experience (section 0.3). What I missed in the experience of *ALONE ALONG* was the process and the development of openness to interactivity. How can one set up a dynamic of action and reaction in experience? The following examples will unpack this "how".

(1)   Relational Stalinism - The Musical

Relational Stalinism - The Musical (Figure 1.1) had a minimalist stage that offered an extravaganza formed by music and performance (Portnoy, 2016). In this performance, the experience went in and through infinite variations of performer-audience relationship as defined by Kenneth Pickering (p.299, Pickering, 2010). Rendering the intent as poetics - "*political and cultural potency in the technology of human language*" (Jerardi, 2016), this intent blossomed out when the performers unfolded eleven pieces of performance before the audience. The performers either spoke directly to the audience (on

Figure 1.1: *Relational Stalinism - The Musical* performed at Witte de With in Rotterdam, in 2016. Left: the scene of Rooms in Which. Middle: the scene of 100 Big Entrance. Right: the scene of 77 Blinks.

the scene of 100 Big Entrance), or inviting the audience to take part in the performance (on the scene of 77 Blinks). In my experience, what happened in front of me became real and close when one of the performers came close to me and told me his name with a barely-heard voice like a whisper. The connection with the performer at that moment distinguished me from others. If there was anything disappointing about this performance, it was that I had to follow in an over-scripted manner in which there were very few valleys and peaks along with my experience.

Unlike the experience in *Relational Stalinism - The Musical* in which the audience is encouraged to complete the performance through his/her existence under the rules and arrangements, in some other performances, the audience is required to produce experience through their participation. Marina Abramović's *Rhythm 0* (Figure 1.2) might be one of these extreme examples.

(2)   Rhythm 0

In performance art piece *Rhythm 0* (Abramović, 1974), 72 objects were placed on the table which had different characteristics. Each was a medium for stimulating different behaviours: some had strong suggestive violence (knife, metal bar, razor blade, hammer, even pistol with one bullet) and some were softer (feather, wine, rose, perfume, or bread). Performing artist Marina Abramović stood still as the NO.73 object, staged in a passive situation - anyone was allowed to do anything to her without responsibility. This piece lasted six hours. As Abramović described in her TED talk, "*the beginning of this performance was easy. People would give me the glass of water to drink, they'd give me the rose. However, very soon after, there was a*

Figure 1.2: *Rhythm 0* performed in Modern Galerija, Ljubljana, in 1974. Left: One audience put a cup of water on the top of Abramović. Right: 72 objects were placed on a table, and the audience was encouraged to use these items.

man who took the scissors and cut my clothes, and then they took the thorns of the rose and stuck them in my stomach. Somebody took the razor blade and cut my neck and drank the blood, and I still have the scar. The women would tell the men what to do. And the men didn't rape me because it was just a normal opening, and it was all public, and they were with their wives. They carried me around and put me on the table, and put the knife between my legs. And somebody took the pistol and bullet and put it against my temple. And another person took the pistol, and they started a fight." (02:23min, Abramović, 2015) Differing from the traditional theatre that is always willing to tell a story, what Abramović tried to reveal in this work - "*what is the public about and how far the public could go even the artist herself did not do anything*" (00:59 min, Zec, 2013) - once without responsibilities and constraints. This unpredictable question was put into a chance-based architecture of actions and directly appealed to the audience. The answers to this question were blossoming out through the actions towards the extreme. The hidden intent, the intent transformation and the consequences coming out of this transformation, all of these intersected productively with a range of audience behaviors and responses.

I view *Rhythm 0* as practical evidence for the ways of shaping the performer-audience relationship in an art scene. The performer-audience relationship is becoming an art form that can utilize the human body as a tool for creating art. What I can summarize from *Rhythm 0* is that it is embodying the formation of performer-audience relationship in its physical provisions. Abramović built an experience among her audience and included them in the dynamics of actions-reactions. Besides the consequences developing in this performance, the intent transformation was clear. Her intent was constructed in the process of its expression.

Where the experience of "*being, doing and knowing*" (Dewey, 1934) was a consequence of following the script and the arrangements in *Relational Stalinism - The Musical*. *Rhythm 0* opened its experience to the unpredictable consequences which were controlled and created by the audience's being, doing and knowing. Both *Relational Stalinism - The Musical* and *Rhythm 0* carry out an essential concern that there is always a live relationship between the performer and the audience which remains or breaks the balance within the dynamics of actions-reactions.

1.2.2 Experience in Interactive Art

In this section, I analyse audience experience in interactive art since it contains several qualities similar to those that performance art provides. The examples above show different ways of managing a live performer-audience relationship could be used to design experience in interactive installations.

American performance theorist Elizabeth Bell summarises the key terminology - constitutive, epistemic, and critical aspects of performance (Bell, 2008) as approaches that can help performer/artist/creator to find out or even challenge the performer-audience relationship in their works. Nam et al. (2014) apply these performance-based criteria to the field of interactive art, and they use constitutive quality, epistemic quality, and critical quality to explain and design the experiences in interactive installations. They also outline the conclusions that applying constitutive, epistemic, and critical aspects to interactive art could help artists to "*foster physical and emotional engagement, influence critical thinking, and reference audiences' social and cultural contexts*" (p.189, Nam et al., 2014). Interactive artists are used to seek spiritual fulfillment and express their induvidual sensibilities through building a communication with audience actively and interactively (Tosa, 2000). Naoko Tosa uses "*interactive art as a type of motion and sympathy interface to portray unconsciousness feeling*" and investigates emotion interface between audience and the computer for effective communication (p.183, Tosa, 2000).

As Candy et al. (2002) discuss, there are four categories of interactive experience in art: statics, dynamic-passive, dynamic-interactive, and dynamic-interactive (varying). These four different categories of interaction can be used to characterise the relationship between the artwork, artist, spectator and the environment (Gero et al., 2005). "*Interactive art is concerned with the way the object performs, as well as how it appears.*" (Candy et al., 2002) Artists have taken into account the development of experiences that engages different processes of perception, interaction scale, reconfigured space, and audience involvement. The coming section outlines a number of practices in the field of interactive art. These practice examples will be interpreted in my attempt to integrate art practice into the focus of this research.

(1)   The Obliteration Room

Throughout her entire career, Japanese artist Yayoi Kusama used dots as abstract expressions in a variety of media, including installations, paintings, sculptures, and performance art. One quotation of hers might explain the intent behind most of her artworks since the middle of 1970 including *The Obliteration Room*: "*a polka-dot has the form of the sun, which is a symbol of the energy of the whole world and our living life, and also the form of the moon, which is calm. Round, soft, colourful, senseless and unknowing. Polka-dots become movement ... Polka dots are a way to infinity.*" (Ewart, 2012)

In *The Obliteration Room* (Kusama, 2012), a domestic environment was recreated in the exhibition space with locally sourced furniture and decoration in completely white. Kusama offered an empty stage which functioned as a blank canvas to be charged through the application of brightly coloured stickers in the shape of dots to every available surface (Figure 1.3). The white room was gradually obliterated over the duration of the exhibition. The space was changing with the passage of time as a result of thousands and thousands of collaborators. This work lets the audience to see and participate by chance, allowing for future growth into what it will be in the end. However, it brilliantly exploits audience participation. The audience is guided and limited to take their actions. From my perspective, it is hard to classify Kusama's *The Obliteration Room* into any one of these four categories of Candy et al. (2002) just by the relationship between artist, artwork, spectator and environment. If seeing what *The Obliteration Room* points out, it actually offers interactivity in its setting when the audience is suggested to take action.

Figure 1.3: *The Obliteration Room* at Tate Modern, London, the United Kingdom in 2012. Left: *The Obliteration Room* was furnished as a monochrome living room in completely white where people are then invited to obliterate with multi-colored stickers. Right: *The Obliteration Room* how it looked like after few days.

(2)   People on People

People on People (Lozano-Hemmer, 2010) is an interactive installation with the intent of searching for "*experiences of co-presence, a platform for embodiment and interpenetration affording entanglement and puppetry*" (Lozano-Hemmer, 2010). It recorded and displaced images in real-time. As the audience walked around the room, they saw their shadow live and recorded images of themselves and others. They played with their shadows into different narratives (Figure 1.4). It is always difficult to judge the quality of an interactive installation based on what is later presented through images and text, or video and websites, especially the ones rely so heavily on the appeal of real-time interaction. We still can get a clear picture that the audience members in this work are endowed with two different functions: on the one hand, they are the resource of content what the experience relies on; on the other hand, they are the medium used to create and complete the collaborative experiences. Through interacting, bodily movements, behaviours, and engagement are condensed into the interactive experience in this installation.

Figure 1.4: *People on People* was exhibited at Manchester Art Gallery, Manchester, the United Kingdom in 2010.

(3)   Magic Eye-Dissolving Borders

Since 1993, artists and researchers Mignonneau and Sommerer began work on process-oriented interactive artworks designed to amplify or respond to aspects of participation. They asserted that interactive systems have the capability of creating, rendering and displaying experiences. *Magic Eye-Dissolving Borders* (Mignonneau and Sommerer, 2010a) produced in 2010 (Figure 1.5) has the intent of developing "*surreal and preposterous*" (Mignonneau and Sommerer, 2010b) experience anchored in a dynamic interactive system. Within this system, no pre-defined scenario exists of what the audience should do and what the audience might see in their experiences. Instead, the artwork is developed by the individual interaction and audience members become part of the resulting work in the process. Through interacting, conflicts have been
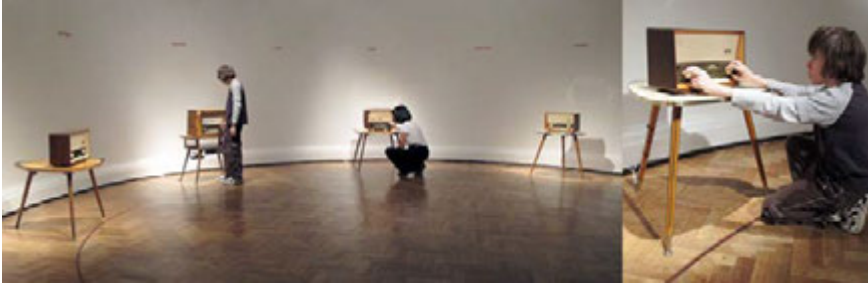
Figure 1.5: *Magic Eye-Dissolving Borders* in Ars Electronica Center, Linz, Austria in 2010.

built between communicable situations and over-communicate consequences within the audience awareness (Mignonneau and Sommerer, 2010b).

Looking at the examples mentioned above, performance art and interactive art share one ground of negotiations between artist and audience. Artistic intent relies on the process of creating and completing the experience. The intent is embodied in the experience through sensory interaction with or without interactive computer system (*People on People* and *Magic Eye-Dissolving Borders*). In some cases, the intent is a narrative of experience through pre-set scripts or arrangement (*Relational Stalinism - The Musical* and *The Obliteration Room*). In other cases, the audience is able to have a greater impact, along with their experiences have brought the artistic creation forward (*Magic Eye-Dissolving Borders* and *Rhythm 0*).

Wonder and resonance are critical in any art experience (Greenblatt, 1990). They are defined by Greenblatt (p.42, 1990) as "*the power of the displayed object to stop the viewer in his or her tracks, to convey an arresting sense of uniqueness, to evoke an exalted attention*" and "*the power of the displayed object to reach out beyond its formal boundaries to a larger world, to evoke in the viewer the complex, dynamic cultural forces from which it has emerged and for which it may be taken by a viewer to stand*". Many practitioners including designers and artists are concreting on designing the accessibility and participation of experience in their artworks. The practitioners have to deal with the tension of the relationship with their audience in their practices. For practitioners who are newcomers of interactive art, they must acknowledge their limited experience of negotiating with their audience. In response to this situation, the next section brings forward the main research question.

1.3   Research Question

This research revolved around the following central research question:

How can practitioners design experience for interactive installations such that it relates their intent to their audience?

I anticipate that: by exploring this question, this research will provide a structural understanding of negotiations between intent and intent transformation, between desired experience and actual experience, and between installation and audience in a design process. Applying for a broader community to use this as a critical language to better understand the relationship between the practitioners and their audience, this question is further detailed in three investigations by the aspects of shifting the dominance between the practitioners and their audience in the process of creating an interactive installation.

1.3.1 Intent and Intent Transformation

Negotiation 1: How can the intent reach the audience?

"*According to a widespread misconception, the creation of great works of art is largely, if not entirely a matter of 'inspiration', a mysterious process whereby ideas simply 'pop' into someone's mind. The talented artist is then conceived of as someone who can deliberate over the sort of work to be made, lucidly make a decision, draw up a plan, and then skillfully execute it. The process can, at least in principle, be broken down into a series of simple steps or techniques and modelled as an effective procedure or program.*"(Livingston, 2005) The negotiation between intent and intent transformation specifies the characteristics of practitioners and audience in designing experiences for interactive installations. On a scale of the experience of interactive works, intent and intent transformation include the practitioners' awareness and orientation in time, place and people, and the practitioners' ability to demonstrate and model awareness and orientation. In the process of intent transformation, the practitioners will repeatedly face finalising and completing choices based on interactivity. "*Interactivity is becoming the fundamental feature of the design process which leads to transformations both in the substantial and the semantic status of art.*" (p.19, Kluszczynski, 2007) Negotiation between intent and intent transformation distinguishes which experience has been served as an instrument to access the interactive installation's content, context,

and structure on the one hand, and which experience has been used and composed as an integral part of the installation on the other hand (Brooks, 2012).

1.3.2 Desired Experience and Actual Experience

Negotiation 2: How to bring the desired experience closer to the actual experience?

I am treating desired experience in interactive installations as sets of patterns or structures that provoke and thereby enhance the raw input of audience's senses. Actual experience that happened in interactive installations is identified by the behaviours in response to external stimuli and cues, such as the stickers in *The Obliteration Room*, the 73 objects in *Rhythm 0*, and the visual responses in *People on People*. Actual experience in an interactive installation can reveal unexpected consequences that may or may not be predicted in the desired experience from the practitioners' points of view. Negotiation between desired experience and actual experience points out possible dimensions to be considered in designing experiences for interactive installations. It includes a diverse arrangement of human activities and the results of these activities. As in the examples above, some artists have an empty desired experience and let audience take over what will happen (e.g., *Rhythm 0*); or some artists script a recipe for desired experience, audiences are guided, following the steps in their actual experiences (e.g., *The Obliteration Room* and *Relational Stalinism - The Musical*); or some artists offer a raw structure for desired experience, to blossom out and grow in actual experience (*Magic Eye-Dissolving Borders*). By going through these different arrangements, desired experience becomes a result when it comes to the actual experience in the end.

1.3.3 Installation-Audience Relationship

Negotiation 3: How can interactivity play a role in installation-audience relationship?

The increased interest in installation-audience relationship is evidenced in the field of Human-Computer Interaction (HCI) and interactive art (Graham, 1997; Schraffenberger et al., 2011; Sommerer et al., 1999). To emphasise installation-audience relationship, tangible features (e.g., movements, vibration, weight, scale) and

audio-visual effects (e.g., laser, light, sound) enforce communicative and expressive characters in the implantations (Nadeau et al., 2009). Nardelli (2010) proposes a classification framework for interactive installations based on three dimensions of the installation-audience relationship: content provider (environment, audience or artist), processing dynamic (predefined change, casual change or evolutionary change) and processing contributors (environment, audience or artist). This framework defines procedures for production and management of interactive installations, at the same time discusses the applicability for describing and classifying the installation-audience relationship in 54 real-life examples. Negotiation within installation-audience relationship is of great relevance to two types of interactivity: the audience can interact with the installations "*among a set of limited and pre-defined possibilities*" (p.6, Nardelli, 2010) or the audience can interact with the installations along with the process in which "*interaction is evolving continuously*" (p.6, Nardelli, 2010). Whereas this negotiation may characterise the order of an interactive experience in which environment, physical form and digital interfaces are reconfigured.

The next section presents a loose framework which is explicitly based on these three forms of negotiation between the practitioners and their audience. The goal of proposing and exploring this framework is to help the practitioners discuss and produce the experience in their interactive artworks. In this framework, the four conceptual components *Drama*, *Story*, *Production*, *Interaction* (DSPI) are identified.

1.4 Components from Performance Theory: Drama, Story, Production, Interaction

Richard Schechner proposes an approach of four concentric, overlapping discs with the largest and the least strictly defined, performance, at the bottom, drama, script, and finally theatre resting on top of each other (Schechner, 2004). Schechner gives a brief summary of the four terms: "*To summarize thus far: the drama is what the writer writes; the script is the interior map of a particular production; the theatre is the specific set of gestures performed by the performers in any given performance; the performance is the whole event, including audience and performers (technicians, too, anyone who is there. It is difficult to define performance because of its flexible and permeable boundaries. In public performances, such as celebrations, festivals, and the like, it is easy to shift between being a*

performer and a spectator" (p.87, Schechner, 2004). Therefore, drama is the source of tension that moves the entire work. The script is the written text in a dialogue form and is in the present sense. Theatre is the production of a play and performance is the different individual action and behaviour including the audience (Schechner, 2004).

The approach from Richard Schechner specially draws from the purpose of artistic inquiry and how the audience influences and shapes the dominance in the process of creating a play. Notions of the parameters of contemporary performance (drama, script, theatre, and performance) are defined with the different dominant characteristics (Schechner, 2004). Schechner states that the dominance in the process of creating a play is shifted as "*the drama is the domain of the author, the composer, scenarist, shaman; the script is the domain of the teacher, guru, master; the theatre is the domain of the performers; the performance is the domain of the audience.*" (p.70, Schechner, 2004) Considering three forms of negotiation between the practitioners and their audience in the process of designing experience for interactive installations, where creating an interactive installation is the sense-making and meaning-making process, the installation still holds a sense that needs to be participated and interpreted by the audience (Pais, 2014). In addition to the sense-making and meaning-making in the practice (Jozwiak, 2013), the consideration of dominance in the design process can be a perspective of looking into the importance of the audience's response for interactive artworks. In light of this, Schechner's approach offers features and inspirations to treat the process of creating an interactive installation as the different steps according to the different dominant characters in these steps.

The proposed framework *Drama*, *Story*, *Production*, *Interaction* (DSPI) is formed in its use of shifting the domination between the practitioners who design the experience and the audience who experience them. Domination is shifted through three forms of negotiation: intent and intent transformation, desired experience and actual experience, and installation-audience relationship in different stages of the design process. Four conceptual components are included in this structure: (1) *Drama*; (2) *Story*; (3) *Production*; and (4) *Interaction*. *Drama* is the domain of the practitioner; *Story* is the domain of the practitioner with her imaginary audience; *Production* is the domain of the practitioner with her practical condition; *Interaction* is the domain of the audience. The coming section will first give explanations for these four components,

followed by a discussion about their roles in use.

1.4.1 Drama

A definition of drama is "*a piece of writing that tells a story and is performed on the stage*" and "*the art or activity of performing a role in a play*" (Learner's Dictionary Online, 2013a). Drama usually can be understood in both literature and theatre (Williams, 1991). The perspective of drama as the source of tension which moves the entire work (Schechner, 2004) is used as a reference in the definition of *Drama* in DSPI: The component *Drama* is growing from the reason of an artwork to exist to the foundation of what an artwork is and how its experience is staged. The component *Drama* is the source of tension, force, emotion, and thoughts from the practitioners. *Drama* in DSPI includes the expression of the intent and the fulfillment of this intent in the process. The process of constructing *Drama* in practice is the process that the practitioners try to find a way to represent their artistic awareness and orientation. From the audience's side, as what Bishop cited from the artist Thomas Hirschhorn, "*the most important activity that an artwork can provoke is the activity of thinking… an active work requires that I first give of myself…*" (p.62, Bishop, 2006a) The physical, cognitive, social, and emotional responses rely on the audience's interpretations of the *Drama*.

1.4.2 Story

Comparing "*a script which has to be understood as the written text or document*" (Learner's Dictionary Online, 2013b) to a story "*has to be understood as an account of imaginary or real events or a condition or set of conditions that affects someone or something*" (Learner's Dictionary Online, 2013c). In DSPI, the component *Story* is not only a result but also a process in which *Drama* is compelling *Story* forwards. *Drama* leads to actionable points and leads to clarity and cohesion of the resulted *Story*. The component *Story* is a means for the practitioners to concretize an indescribable and vague feeling into a narrative regarding *Drama* that is relevant to a situation. Comparing to *Drama*, *Story* is a more concrete description of a desired experience: how it happens; when it happens; where it happens; who is there; who else is there; the start and end points; at some moments in time at some points in space; the cultural and social context. In *Story*, the practitioners narrate their *Drama* as a

desired experience, and start to involve behavioural possibilities into the experience. This situation gives the surroundings for the next component: *Production*.

1.4.3 Production

In Schechner's approach of creating a play, the theatre is used to describe the dominant characteristic of performers in a set of gestures encountered by the audience (Schechner, 2004). In DSPI, *Production* is a work presented to the public and at the same time is the process of producing: "*transforming the floor into a sea, a table into a confessional, a piece of iron into an animate partner*" (p.21, Grotowski, 2012). The acceptance of *Drama* and *Story* in an interactive installation depends on *Production*. In *Production*, physical form and interactivity are designed in parallel. The design process of implementing an interactive artwork may not just fully rely on physical form as a medium which is already absent in Internet art (Ippolito, 2002). "*Interactivity inherent in various digital media allows an unprecedented degree of involvement creating a space for dramatic participation and engagement.*" (p.134, Carroll, 2002) In the DSPI framework, *Production* is the stage of experience-given and experience-adaptive. The concept of *Production* is concerned with how an interactive installation performs the *Story* rather than what it looks like. In other words, the component *Production* is a means used by the practitioners to achieve the desired experience.

1.4.4 Interaction

Schechner describes performance as an umbrella term containing multiple spheres of rituals and dramatic expressions from rituals to everyday life behaviour (Schechner, 2004). In Human-Computer Interaction (HCI), scholars argue that an interactive artwork is only completed with the interaction or participation of people (Bishop, 2006b; Loke et al., 2012; Muller et al., 2006; O'Reilly, 2009; Winkler, 2000). An artwork becomes interactive only through the artist's use of it and the audience's reaction to it (Edmonds et al. 2004). The component *Interaction* in DSPI means that interactive installations cannot serve an experience without the active physical participation of the audience. *Interaction* completes the whole installation and its experience through audience participation. *Interaction* is capable of negotiating between the practitioners and their audience by taking into account the vision, feeling, and judgment in the audience's actual

experience. *Interaction* is where the desired experience is being realised by *Production* and the actual experience is happening in reality. Conflicts and misunderstanding might appear in *Interaction* in case the desired experience is "broken" and the actual experience is different. In a way, *Interaction* is a design result which links to the anchor of *Drama*, the set of *Story*, and the forms of *Production*.

The four conceptual components mentioned above constitute the DSPI framework that the practitioners can use in their practices to elicit negotiations between intent and intent transformation, between desired experience and actual experience, and within the installation-audience relationship. Rather, it can be useful for gaining a better understanding of how experience in interactive installations is likely to be created and be offered to the audience as intended. DSPI at this point is a loose collection of four components. It will grow into a framework with a clear structure and process as next steps.

With the relevant definitions clarified, the next section will move on with introducing the methodology used in this research.

1.5   Methodology: Practice-based Research

This thesis documents an iterative process presenting the various strands of discourse, practice, and critical inquiry through international workshops, successive interactive installations and their evaluations. Graeme Sullivan describes this process as "*a braid-like structure*" and it "*describes creative and critical habits of mind and habits of practice that are at the core of the thinking and making processes involved in art as research.*" (p.191, Sullivan, 2010) Rather than working through "*art practice as research*" influenced by bio-psychology as by philosophy and pedagogy (Dewey, 2005) or "*research through design*" influenced by scientific inquiry through "*design practice to provide a better understanding of complex and future-oriented issues in the design field*" (Godin et al., 2014), this work is more of practice-based research (Niedderer et al., 2007; Russell et al., 1997; Candy, 2006). It posits that by drawing on practical processes and scientific theories this will reveal where they overlap, mutually enforce each other and produce insights that concur with both. It also shows that the divided perspectives from practical making and theory learning can yield grounded understandings, definitions, and a clearer framework for designing experiences for interactive installations.

Practice-based research is a significant element in all of the coming chapters in this thesis. This work will, therefore, demonstrate artistic creativities, imaginations, and skills in order to make substantive and original contributions to both research and practice.

1.6 Thesis Outline

Cycle 1: Emerging Pattern

Cycle 1 is a view of showing how the DSPI framework emerged its pattern in practice. The result of Cycle 1 provides an important direction of using DSPI as a possible approach. This cycle includes the international workshop Interactive Patina of Culture (chapter 2) and one project *NOTMASKI&II* (chapter 3).

Cycle 2: Start from Drama

In Cycle 2, the DSPI framework is used as an approach - from *Drama* to *Story*, from *Story* to *Production*, and from *Production* to *Interaction*. The project *REPLICATION* (chapter 4) and the international workshop Nature (chapter 5) followed the DSPI approach. Starting from chapter 4 and applying a strict linear DSPI approach in the design process of two *REPLICATION* installations, chapter 5 offers an opportunity to see the generality of this approach when used by groups of students. Cycle 2 concentrates on the effects when the DSPI framework is used to guide the design process. The results of Cycle 2 give the further direction for the final steps of this research.

Cycle 3: Start from Drama, Return to Drama

Continuing with the insights from Cycle 2, Cycle 3 features the design process (chapter 6) and the empirical evaluation (chapter 7) of the project *HEART IS THE ONLY WAY*. The DSPI approach guides the whole design process. Several iterations between *Story*, *Production*, and *Interaction* are applied. DSPI helped me to negotiate with the audience by thinking through three questions: (1) how to transform the intent into the audience perception; (2) how to bring the desired experience close to the actual experience; and (3) how can interactivity play a role in the installation-audience relationship. The interactive installation was empirically evaluated, and the experiment and the findings are presented in chapter 7.

BREATHING UNDERNEATH (2014)

photography/performance

BREATHING UNDERNEATH (2014)

photography/performance

CYCLE 1

EMERGING PATTERN
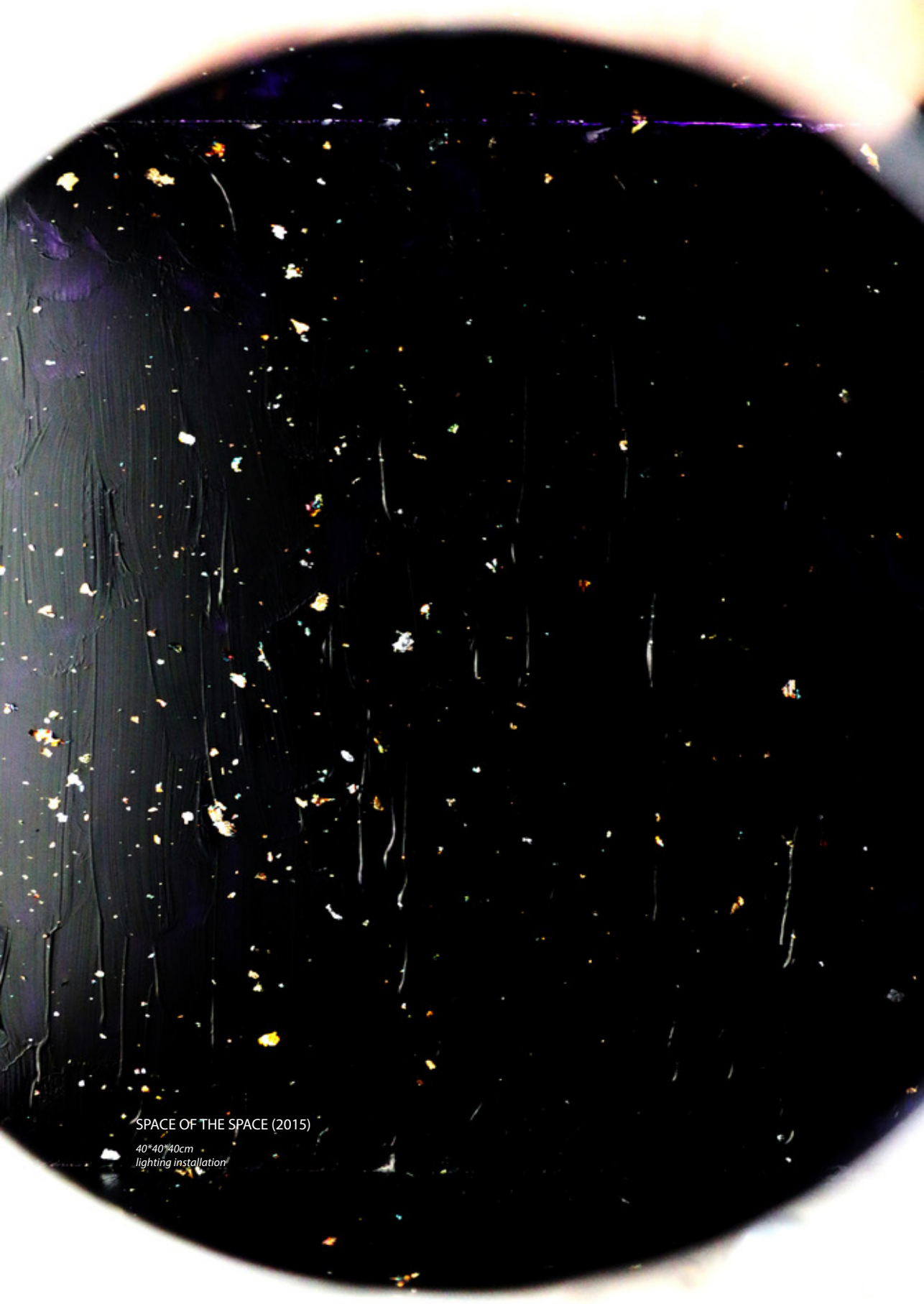
SPACE OF THE SPACE (2015)

*40*40*40cm*
lighting installation

CHAPTER 2

INTERACTIVE PATINA OF CULTURE

"*Book from the Sky and Square Word Calligraphy have different effects on people from different cultures, but the entry point is essentially the same. In both, the invented characters have a sort of equalizing effect: they are playing a joke on everybody, but at the same time they do not condescend to anybody. For example, there is no one on earth who can read and comprehend the characters in Book from the Sky, myself included. Square Word Calligraphy, on the other hand, exists on the borderline between two completely different cultures. To viewers from these two cultures, the characters present equal points of familiarity and of strangeness. A Chinese person recognizes the characters as familiar faces but can't figure out exactly who they are. To a Westerner, they first appear as mysterious glyphs from Asian culture, yet ultimately they can be read and understood. If you use existing concepts of Chinese or English to try and read or interpret these characters, you won't succeed. This total disconnection between outer appearance and inner substance places people in a kind of shifting cultural position, an uncertain transitional state.*"

- Xu Bing (2003)

2.1   About this Chapter

Interactive Patina of Culture was an international workshop which was conducted at Science and Education Newtown of Taicang in China from October 21st to November 8th, 2013 for three weeks. It was organised in close cooperation with TU/e[1] in the Netherlands and SDM[2] in China. This workshop was the first exploration of using the DSPI framework to design experience for interactive installations. This chapter aims to: (1) understanding the characteristics of the four components - *Drama*, *Story, Production*, *Interaction* in creating interactive installations in the contexts of Chinese culture and local situations; and (2) discovering and investigating the pattern of using the DSPI framework in the design process.   A brief introduction to the workshop set-up and the resulting projects (section 2.2) is followed by the discussions of developing and structuring DSPI in section 2.3. Section 2.4 unfolds the reflections from the workshop about how DSPI was used in the design process.

2.2   Workshop Interactive Patina of Culture

2.2.1 Theme

Interactive Patina of Culture as the theme for this workshop is "*a concept in the space between cultural studies, experience design and human-computer interaction*" (p.211, Frens et al., 2013). The concept of "*Interactive Patina of Culture*" uses existing daily events and daily objects as source materials for designing interactive experiences. "*It is one way to understand recent globalisation in design, namely not in terms of cross-cultural design as a one-fits-all formula, but instead as a set of different designs centred around a common rationale, but rooted in different cultural contexts. At the same time, 'patina' conveys the understanding that time and use of artifacts will result in ageing, in becoming closer to the person and cultural identity of the user, also known as 'graceful ageing', however, this cannot be limited to the designed artifacts: the process of designing and the designer are likewise to be included in this notion.*" (p.211, Frens et al., 2013)

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1 TU/e: Department of Industrial Design of Eindhoven University of Technology: *https://www.tue.nl/ universiteit/faculteiten/industrial-design/*, retrieved: 05-10-2016.
2 SDM: School of Digital Media of Jiangnan University: *http://dm.jiangnan.edu.cn/*, retrieved: 05-10-2016.

2.2.2 Aim

The DSPI framework and its four components (section 1.4) were introduced at the beginning of this workshop to inform the process of designing an interactive installation. Interactive Patina of Culture as the theme was introduced to the students at the same time. The students applied the DSPI framework to their processes. Special attention was paid observing how the student used DSPI in designing experience for their installations. The workshop was organized to gain insights into: (1) how the students transformed the theme (Interactive Patina of Culture) into the experiences they designed; (2) what the audience experienced and understood the installations; and (3) how four components were used in the process.

To achieve the aims, the workshop consisted of the following steps:

Step 1: lectures on practical skills - cardboard modeling (seven hours on October 21st, 2013) and programming (three hours on October 22nd, 2013).

Step 2: lecture on DSPI as an inspiration for creating interactive installations (two hours on October 22nd, 2013).

Step 3: Performance session - around five topics of Enthusiasm, Elegant, Patient, Arrogant, and Angry, students in groups formed their expressions in means of the rich body actions (fifteen hours in total from October 22nd to 24th, 2013).

Step 4: Four components led the process of creating interactive installations (seventy-two hours in total from October 24th to November 7th, 2013).

Step 5: Exhibition (three hours on November 8th, 2013).

2.2.3 Participants

Thirty-one students formed nine groups with mixed backgrounds and skills: nine students from TU/e had experiences in creating interactive products and interactive systems, and most of them had highly developed skills in dealing with interactive technologies. The rest from SDM had experiences in digital technology and digital art before. None of the students had previous experiences with creating interactive installations.

Four coaches from TU/e also participated in this workshop. All

of them had formal training as interactive designers or worked as designers in academic research. They were from Computer Science, Interaction Design, and Art and Design backgrounds. Three teachers from SDM assisted in the workshop, coming with a background in Industrial Design and Digital Media.

2.2.4 Resulted Installations

The workshop started with analysing and understanding Interactive Patina of Culture in a particular context. The students needed to define patina, culture, interactive patina, and then interactive patina of culture, and transform their understandings into the design of experience, in which the process relied on their abilities of contextual imaging. The results and the design process provided raw material for me to reflect on the proposed DSPI framework.

To work with the theme Interactive Patina of Culture, some groups explored attitudes and behaviours from ancient Chinese rituals and turned these into a form of interactive installation (*Memory* and *The Benevolence/The Modest*). Some groups simply started from social activities in the context of Chinese daily life and brought the whole activity on the stage of the public space (*Ju-Together*). Some installations represented the long-standing cultural phenomenon through interactivity and rebuilt a new experience and inter-pretation for the audience (*FACE* and *The Way Back Home*). Some installations selected the elements from the Chinese culture and symbolised them as visual output for the interactive experience (*WUXING* and *CONSISTENCY*).

Below I will choose four representative groups for further presentation and describe how these student groups interpreted the theme Interactive Patina of Culture and designed experience in their

Figure 2.1: The joyful emotion (left), and the hand gestures of making food (right) were showing in *Ju-Together*. (stills from the concept video by Rick de Visser, Wenjun Zhao, and Weidi Wang *http://desis.id.tue.nl/2013/10/tue-desis-lab-taicang-workshop-2013-oct-group-5-ju-together/*, retrieved: 23-03-2016)

processes.

Preparing food together as one phenomenon of Chinese food culture was deeply anchored in the installation *Ju-Together* (聚). The joyful emotion and the hand gestures of making food were highlighted in the design of *Ju-Together* (Figure 2.1). The involvement of different people being together and the value of being together and creating together were transformed into the interactive experience. This installation showed the understandings of cultural and social perspectives of Interactive Patina of Culture and the process of transforming these understandings into the final result.

FACE (Figure 2.2) took the meaning of face in Chinese culture (Brunner and You, 1988) and chose Nanyang Square in the center of the Taicang city as the installation location. The installation targeted enhancing the relationship and awareness in public by playing with this interactive installation. The concept of face was simply to dispel the mask (Tosa et al., 2011) and bring people closer to each other. This group of students started with using projection-mapping to overlay human faces with projected masks to explore the interactivity. Later, by using Kinect technology, the movements of one person's finger
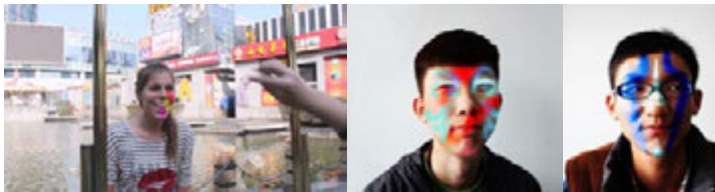
Figure 2.2: Left: *FACE* at Nanyang Square. Middle and right: from projecting different masks on the face to draw different masks on another people's face. (photos by Tove Elfferich, Miao Bo and Binyi Qian)
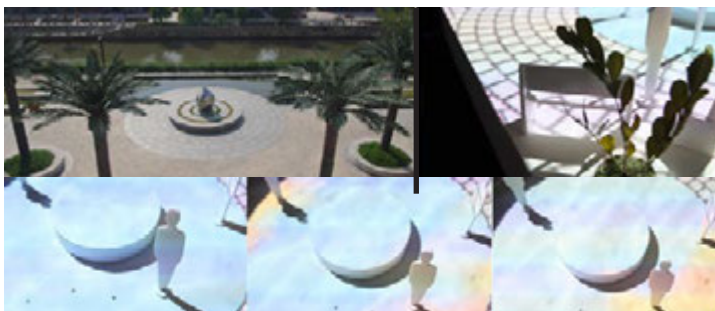
Figure 2.3: *CONSISTENCY*. Top left image: The public square in the centre of Taicang was chosen as the installation location. Rest of images: the public square was modelled with cardboard. The students used video animations to simulate the interactivity. (photos by Yasemin Arslan, Kai Kang, Sara Wang and Danny Wu)

could be captured and left colour marks on another person's face.

The installation *CONSISTENCY* (Figure 2.3) was based on the philosophical notion of yin-yang (阴阳) and acted as a reminder of this ancient Chinese philosophy. The place that was chosen for this installation was a public square in the center of Taicang located next to a river, surrounded by green trees. In this project, yang was treated as solid and hard matter and yin as liquid and soft, being two opposite elements. This Installation used the surroundings to connect abstract philosophy with the public space by designing an interaction in which one can leave traces in the sand (yang and solid) and over time the water (yin and liquid) would erase the traces this person left behind.

Another student group was inspired by a stone arch bridge in the ancient Shaxi Town of Taicang to create their installation *WUXING* (五行). This group of students developed a fivefold concept in Chinese culture to explain a broad array of generating relationships between five elements (wood, water, fire, metal and earth) (Figure 2.4). In this installation, people could enter the inner circle floor through five bridges. Each bridge was represented one of five elements by a different colour. By walking over the different bridges and arriving on the inner floor, people could realise they were influencing the balance of the inner floor and the dynamics of the projected image on the floor. This example tried to transform the theme Interactive Patina of Culture into the process of the experience and the resulting visual output.

Figure 2.4: *WUXING*. (photos by Bram Naus, Shengxiong Zhang, Zixin Ye and Zehui Li)

The examples show that the students' design process started from the depth and breadth of Interactive Patina of Culture, and the direction of transforming Interactive Patina of Culture into the interactive installations. The interactive installations were for the transformation of the theme in the context of Chinese culture. Interactivity in the designs served as a means of accessing the theme when designing experiences. The following section will discuss how

DSPI was used by these student groups.

2.3 DSPI in Workshop Interactive Patina of Culture

In this workshop, the DSPI framework was still conceptual and at a high level of abstraction. Still, I tried to observe how the students used DSPI in their design processes and whether any pattern might emerge from the practices (Figure 2.5). When the students were switching back and forth between the theme Interactive Patina of Culture and its *Production*, consciously or not, the component *Story* became a necessary process in which the students selected the essential characteristics of the context - a location, an object or an event. The story was not just a noun representing the final desired experience but also a verb to describe the actions of finding out the desired experience during the design process. In this workshop, storying a desired experience happened through iterations between the theme and *Production*. By doing this, the students could enrich the theme with content and prescribe the solutions for *Production*.

The observations during the design process offered certain directions for the further development of DSPI: (1) the students used metaphors as an element referring to the theme to build up towards their final Production, such as face in *FACE*, yin-yang in *CONSISTENCY* or the five elements in *WUXING*; (2) the students used emotions in the cultural activities as examples (enjoyment in *Ju-Together*) to design the audience's experience in their installations; (3) Interactive Patina of Culture functioned as a theme in this workshop. The theme was taken into account and it influenced the means of expression and transformation. In total, theme, emotion and metaphor
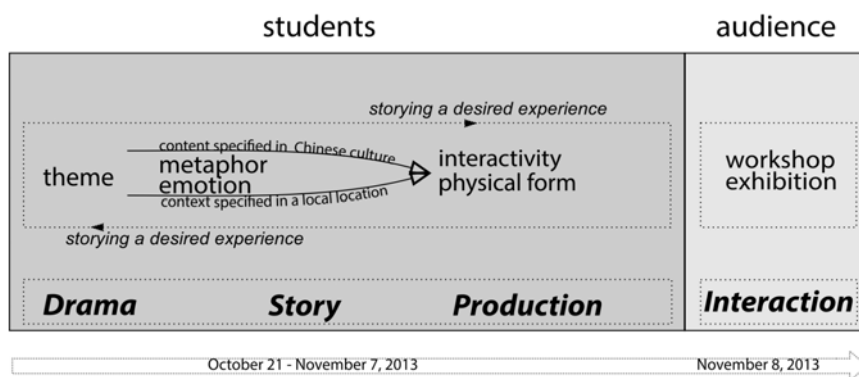
Figure 2.5: The pattern of using the DSPI framework by the nine student groups in the workshop Interactive Patina of Culture.

represented a common thread going through the whole design process. They were assumed to be recognized by the audience in the actual experience; (4) Storying a desired experience carried theme, emotion and metaphor into the final *Production*; (5) *Production* was set up according to different contexts and practical situations that ranged in size from small objects to large and noticeable installations or architecture, from screen-based applications to mixed digital and physical installations in a given environment; and (6) *Production* with its physical form and interactivity faced directly to the audience in *Interaction* where the actual audience experience happened. The use of DSPI also placed emphasis on *Interaction* happened between *Production* and the audience. This emphasis helped the students keep track on whether the actual audience experience was achieved as desired or not.

2.4   Reflection

Looking back, I see more value in the process towards the results than just in the results of this workshop. The workshop Interactive Patina of Culture was the first exploration of using DSPI as a framework to explore three forms of negotiation between the practitioners and their audience when designing experience for interactive installations with the aim of relating the experience to their audience. In the next section, I reflect on the use of DSPI in this workshop under these three forms of negotiation.

2.4.1 Intent and Intent Transformation

In the workshop, the students' interactive installations were themed in Interactive Patina of Culture, but the focus was: (1) from the audience's perspective, their experiences served as a means of accessing the theme and reassembling the interpretations of this theme over time in collaboration with a specific context; and (2) from the students' perspective, working on the experienceability of the theme fulfilled the function of the experiences designed.

The student groups used objects or activities within their contexts to formulate physical forms and interactivity of their installations. These objects or activities and their contexts helped the students when they were transforming their intents. In the installations *FACE* and *Ju-Together*, if the audience acted out drawing or making food, these actions created the experience with the emotions as responses.

In the installations *CONSISTENCY* and *WUXING*, the principles of yin-yang and five elements acted as a reminder of an ancient Chinese philosophy. Both installations used the selected locations to connect abstract philosophy with the exact public space to solidify their understandings of Interactive Patina of Culture.

The theme yielded rich and vivid contextual information, the communication became problematic when the transformation was in progress - either from the theme to the interpretations or from the interpretations to *Production*. During the workshop, the students asked each other repeatedly in their group meeting: "*What does 'Interactive Patina of Culture' mean for you?*" The students found it hard to reach a consensus with the understanding of Interactive Patina of Culture when communicating in the group. There are mainly two reasons for this problem: the language difference and that the theme Interactive Patina of Culture was too abstract to grasp.

The students also experienced limitations in their programming skills. "*Programming is too hard*" was the complaint often heard. That was why food-making in *Ju-Together* was just playing with different colourful blocks (Figure 2.1), and *CONSISTENCY* just projected blue colour for yin, yellow colour for yang (Figure 2.3).

2.4.2 Desired Experience and Actual Experience[3]

In discussing this negotiation, I take the installation *CONSISTENCY* as an example. The actual experience was developed closer to the desired experience in the process of storying the possible behaviours and the resulting responses. The traces left behind were the non-verbal and emotional information (Nakatsu et al., 2006) in this installation. Interacting with this installation by one person would leave traces for another later. The full spectrum of experience was felt by people as they encountered the traces left behind by people who had previously passed through the installation space. As someone walked alongside the water, ripples appeared as if triggered by the steps of this person. When the person approached the water, it retreated to the opposite direction, and the sand became visible and by the person walking around footsteps appeared on the sand. After the person had left, the water came back and slowly erased the created footsteps. Multiple participants in this installation cooperated to find new ways of creating footprint patterns and play around with

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3 Part of this section is based on: Zhang, Y., Frens, J.W., Funk, M., Hu, J. &Rauterberg, G.W.M. (2014). Scripting Interactive Art Installation in Public Spaces. In proceedings of the 16th International Conference, Human-Computer Interaction. Theories, Methods, and Tools, 22-27 June 2013, Heraklion, Crete, Greece (p. 157-166).
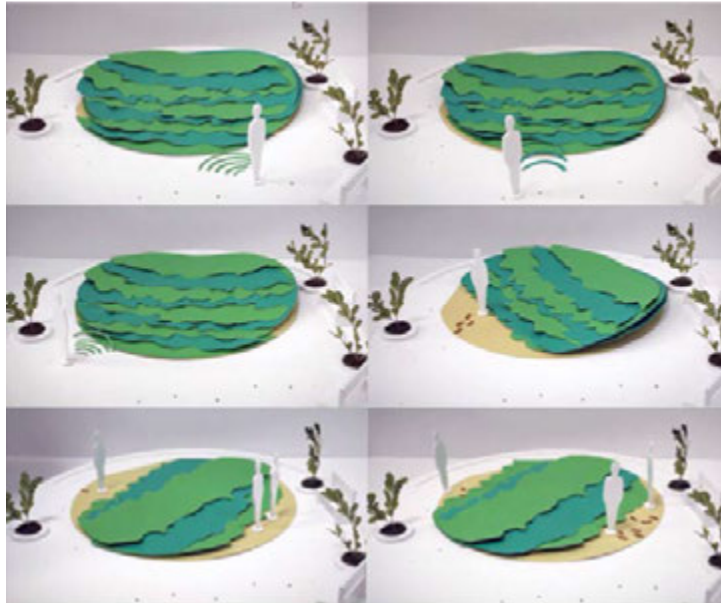
Figure 2.6: *CONSISTENCY*, the storying process utilised cardboard prototypes and produced detailed annotations towards a desired experience. (photos by Yasemin Arslan, Kai Kang, Sara Wang and Danny Wu)

the balance of the opposite elements (Figure 2.6). Step by step, this student group produced detailed annotations through storying the desired experience and tried out different implementations.

I take *CONSISTENCY* as my starting point to distinguish two perspectives on experience in interactive installations: the perspective from people who design the experience and the perspective from people who actually experience it. In this workshop, the students worked "*in a space that is constrained by a number of different considerations*" (p.1, Norman et al., 2003). When the students designed the desired experience, they used local culture and local space as the source of affective reactions from the perspective of actual users of their installations. They were storying the desired experience and considered implementations to push the desired experience to be fulfilled as close as intended.

2.4.3 Installation-Audience Relationship

An exhibition was held on November 8th, 2013 at Science and Education Newtown of Taicang. Each student group created a poster and a concept video for the exhibition. The poster and the concept

Figure 2.7: *FACE* and *Ju-Together* at the exhibition. The first line, left: one participant tried to draw masks on the other's face in installation *FACE*; right: the participant being drawn. The second line, left: a group of audience participated and interacted with the installation *Ju-Together*; right: the visual output of *Ju-Together*. (photos by Tove Elfferich, Miao Bo, Binyi Qian, Rick de Visser, Wenjun Zhao, and Weidi Wang)

video were in both Chinese and English and focused on explaining the background of the installations. During the exhibition, the students let the audience wander on their own and were available to answer the questions and explain the work.

Two installations (*FACE* and *Ju-Together*) provided the audience with an interactive experience. These installations allowed the audience experience and interact with the installations on their own, without first introducing the installations to them. Figure 2.7 shows how the audience participated and interacted with these two installations. As for *FACE*, a common scenario of the participation was that the participant tried out the role of being drawn and asked other people to take photos for them. The first thing they could do after was to check the photos. Another observation in *FACE* was that the conversation always happened between two participants - one drawing, and another being drawn. Quotes like "*Are you done?*" and "*Almost. Don't move your head.*" were often heard from them. *FACE* attracted most of the audience in this exhibition, and many of them were just standing around as spectators. In *Ju-Together*, three people could interact with the installation at the same time. The most interesting observation was that while the participants were interacting, they were always trying to act as a group.

The other installations showed their interactive experiences as projected animations on the mockup models (Figure 2.8) together

Figure 2.8: Mockups at the exhibition. Left: *Memory*. Middle: *The Benovolence/The Modestone*. Right: *WUXING*. (photos by Danny Wu)

with the literal descriptions and the concept videos. These student groups sometimes had to talk to the audience to offer an explanation. These installations were accessible for the audience to understand the intended experience they might have.

Presenting fifteen days of works in a one-hour exhibition was difficult. The audience of approximately twenty people actually interacted with the installations *FACE* and *Ju-Together*. For the mockup installations, even with the literal descriptions and concept videos at the exhibition, it was hard to observe the actual audience experience. While the previously mentioned problems indicate suggestions for improvements for future workshops with similar aims, the next step is to research other patterns of using DSPI in the design process. I also want to complete the desired experience more in a real-scale installation to evaluate what the actual audience experience will be, and investigate how DSPI could help in this process.

Acknowledgements

Be Difference - Compose Together (2017)
work together with Marina Provatidou

3*4*2.5m
film/performance/interactive installation

CHAPTER 3

NOTMASKI&II

"*Art, if it has any value at all, is the product of deep and often rationally incommunicable perceptions, and to try and explain or share those perceptions in a communally created artwork will negotiate and re-edit them to banality.*"

- Jonathan Jones (2010)

3.1   About this Chapter

This chapter gives an account of the steps of creating and exhibiting the project *NOTMASKI&II* (section 3.2-3.4). I have sought ways to record, understand and integrate the use of DSPI in the design process. With this project, I investigate the DSPI framework for understanding and demonstrating whether it supports the negotiations between myself and my audience through the intent transformation, the design and implementation of a desired experience and the building of installation-audience relationship by means of interactivity. The results provided input for the further development of DSPI in practice (section 3.5), demonstrating the evidence of structuring the DSPI framework as an approach to designing experience as intended for interactive installations (section 3.6).

3.2   Introduction

Compared to the workshop Interactive Patina of Culture, *NOTMASKI&II* provided more insights and reflections from an artistic perspective. *NOTMASKI* is a mixed media installation presented as a film (*WHO*[1], 10:15min), and six paintings[2] (*YOU*, *ME*, *HIM*, *HER*, *US*, *THEM*). *NOTMASKII*[3] is an interactive installation.

NOTMASKI&II started with my personal experience and the confusion I felt in a foreign culture. Since I moved from China to the Netherlands, on any given day, I saw my colleagues working behind their computers in our office. After one more year of sitting in the same room, I might know what they were working on, but what I did not know was if they were happy or not; how they felt about the weather of the day; and what was the most interesting thing that happened to them last week. Their computer monitors blocked their faces. If looking over their computers, emotions and feelings were ambiguous on each face. I worked in this kind of environment for over one and half year, these ambiguous emotions made my own feeling of being lost in this foreign culture, leading to my desire to represent this situation via an artwork.

At the very beginning of *NOTMASKI&II*, I did not have a clear purpose. I only wanted to know two things. The first being that once I offered a stage and invited colleagues to perform, I wanted to know

1 Available at: *https://vimeo.com/106163032*, retrieved: 23-5-2016.
2 Available at: *http://yuzhang.nl/notmask*, retrieved: 23-5-2016.
3 Available at: *https://vimeo.com/102906532*, retrieved: 23-5-2016.

how they would behave on this stage. The second was that I wanted to know how far my artwork could go if interactivity was involved at different levels. Participatory performance in *NOTMASKI* was strategically used to inform the design of a desired experience in *NOTMASKII*. *NOTMASKII* offered its interactive experience in a functional real-scale interactive installation. The design process of *NOTMASKI&II* investigated the functions of four components - *Drama*, *Story*, *Production*, *Interaction*. I treated this project as an exercise of the co-creation process between the performing-participants (in Participatory performance), the audience (at the final exhibition) and myself, to investigate the possible structures of DSPI in use and the possible functions of *Drama*, *Story*, *Production*, *Interaction* in the design process.

3.3 NOTMASKI as Inspiration

Performative Experience Design has been used as a methodology for designing interactive experience with technology (Spence et al., 2013). It offered a new perspective for me to consider my audience as performers in the context of experience design. *NOTMASKII* started during the process of creating *NOTMASKI*. *NOTMASKI* inspired me to design experience for *NOTMASKII*. *NOTMASKI* used Participatory performance as a strategy which helped to collect materials and these materials were finally transformed into *NOTMASKII*.

3.3.1 Participatory Performance and Interactivity

Participatory performance occurred in three different contexts - a photo studio, private environments, and public spaces. I offered six different kinds of animal masks (pig, deer, panda, rabbit, zebra, and rooster) as choices for the participants. The results helped me define the different emotional and behaviour representations for each mask in the different environmental situations.

(1)   Context 1: photo studio

Thirteen performing-participants were invited into a photo studio, asked to pick from a selection of animal masks and given five minutes to consider their upcoming performance. After that, they could start their performance in front of a camera for as long as they wanted.

Figure 3.1: Three participants wore the same animal mask (pig), performing in front of the camera in a photo studio.

These performing-participants were of different age (from age 22 to 36 years) and from various cultures (Dutch, Chinese, Indonesian and Nigerian).

An interesting observation was that some performing-participants liked to use props to set up their stages, such as a pen, a mobile phone, or the spotlight which that was equipment of the photo studio. These props helped the performing-participants to form their stories and complete their performance around the stories (inside their mind and invisible for me). Another interesting observation was that the performing-participants (all of them) tried to express their individual emotions with the mask they wore. That made their performances different even with the same mask. As shown in figure 3.1, from left to right, the same pig mask was performed as three different roles: an arrogant and trendy female; an indifferent and self-focused boy; and a complacent superstar. The third observation was that some participants liked to use conflicts as a dramatic vehicle to set up their performance, for example, a pig was transformed from a greedy and dull image into an elegant and arrogant one (Figure 3.1, right).

Props, emotions, and conflicts also could be found when one of the participants tried to perform with different masks, to act out various actions and stories with these masks. Figure 3.2 shows that one participant wore pig, deer, panda, and rabbit masks. With the help of a spotlight, a jacket, a chair, a knife and a fork, he performed a super-star style pig in front of a camera, an angry deer in a fight, a dancing panda in a party, and an evil rabbit eating bloody meat as dinner. The conflicts were that a stupid pig was becoming a shining star; a gentle deer suddenly had a violent temper; a slow and lazy panda could dance skillfully; and a wholly vegetarian rabbit was greedily eating raw meat.

Figure 3.2: One participant wore different animal masks (pig, zebra, deer, rooster, panda and rabbit), performing in front of the camera in a photo studio.

(2)   Context 2: private environments

In this context, the content was chosen to follow the traces of performance in daily life. I took the role of being a performing-participant. On some scenes, such as taking off my pants to use the bathroom or changing clothes to go sleeping. Facing the camera was quite embarrassing but the mask gave me a certain sense of security (Figure 3.3). During the time like showering, I had to ask to stop filming because taking a shower in front of a camera was crossing my border, even with a mask. In general, the whole process of performing in private environments was quite usual for me. I did what I normally would do and didn't especially create a dramatic moment. The only strange moment was when I looked into the mirror seeing myself with a zebra head, which was a confronting, strange and confused moment.

Figure 3.3: I wore the zebra mask, performing in front of the camera in private environments. The private environments from left to right: toilet, bed, and living room in an apartment.

(3)   Context 3: public spaces

Since one resemblance of most interactive installations is that they are usually placed in a public space (Höök et al., 2003) where plenty of people, spectators can be counted as an influence for interactive behaviours within the experience. Therefore, I tried to get grip on what was occurring once the performance was happening in the public spaces. I continued my role of a performing-participant in this environment. Public spaces influenced my performance to different degrees as well. In the taxi, I had to answer the question from the driver why I was doing this. On the street, I had to deal

Figure 3.4: I wore the zebra mask, performing in front of the camera in three different public locations.
The three public locations from left to right: taxi in Taicang, China; a public square in Taicang; IKEA in Eindhoven.
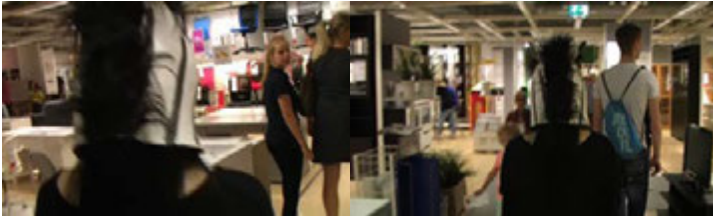
Figure 3.5: Public reactions to me who wearing the zebra mask in the crowded IKEA in Eindhoven, the Netherlands.

with some people who were pointing their fingers at me. In a big crowded store, I had to stop my performance because people started to avoid being filmed and the employee harshly told me filming was not allowed (Figure 3.4). In the public space, people's attentions made my performance more careful and cautious, and I tried to avoid meeting their eyes (Figure 3.5). To continue my performance in the public spaces asked for great courage. At some point, I had to give up.

Participatory performance took place in three different contexts. The results brought personal and cultural senses to the different stages in which hiding or giving up part of the self. The results of Participatory performance also provided the input for me to understand public influence and the different behaviours. This guided me to design the interactive experience for *NOTMASKII* (section 3.4.1). Different movements and behaviours were gathered from the performing-participants in Participatory performance. Some of these movements and behaviours were used for designing *NOTMASKII*.

3.3.2 Metaphor, Conflict, Emotion, and Theme

(1) Metaphor

In *NOTMASKI*, the use of the mask was inspired by "*all the world is a stage and all the men and women merely players*" (p.63, Shakespeare et al., 2015) and Tosa et al. (2011). The mask posed a question to reality - once our life was put under the attention, how much would we act? What complicated the use of the mask in Participatory performance was that the performing-participants did not always act the same. They drew connections between different masks and stayed in the acting. The participants could then give their own interpretations to the masks. The mask offered the sense of security and privacy on the one hand. On the other hand, it created a focused point to

force the participants to adapt their acting just by watching others' reactions or changing the role of bystanders into spectators with a strong influence. The mask had the strong meaning of covering face and leading to the links - the links between the judgments of the spectators in the public spaces and behaviours of the people who wore them. Each mask could contain different interpretations to various degrees. Therefore, mask was used as a metaphor in *NOTMASKII* later on.

(2)   Conflict

Gotthardt (2016) once quoted Quanzhou born, New York based artist Cai Guoqiang's statement that conflicts are what human being experience in common - "*As an artist, you inevitably have different conflicts with the world, with the country in which you're working, with history – it is unavoidable. But this is life, this is the truth.*" The potential of using conflict in the performance helped the performing-participants become more aware of non-verbal aspects of their behaviour and sometimes towards creative solutions. Later, the experience offered by *NOTMASKII* involved conflict as well. In *NOTMASKII*, when the participant and the spectators co-existed together, the visual output was created by the position and the movements of the individual participant. The time of producing the visual output was determined by the spectators as a group.

(3)   Emotion

Using Participatory performance, the performing-participants expressed their emotions through their acting. These emotions were defined by the individual performing-participant in *NOTMASKI*. Later in *NOTMASKII*, emotion was present through its intentional omission and was formed in the actual experience by the individual participant.

(4)   Theme

If artists are working with special exhibitions or festivals, they maybe have to create their artworks around the theme proposed by the organisations. For some other self-developed artworks, the theme chosen by the artist is related to their own situations. Such as Ai Weiwei, his politically charged installations are created due to

Figure 3.6: Part of 70*100cm mixed material painting *THEM*.

his political stance towards democracy, freedom and human rights (Strafella et al., 2015). For me, implying different themes in the six paintings (*YOU*, *ME*, *HIM*, *HER*, *US*, *THEM*) provided insights into the final choice of the theme in *NOTMASKII*. Finding subject matter was a long struggle in the process of drawing these paintings.

As an example, the painting *THEM* (Figure 3.6) used six different photos of a Chinese political figure, who was performing in a soft diplomatic style on the world stage. In this painting, this political figure's faces were all covered by a deer mask with different angles. The intent of drawing *THEM* was that on the world's diplomatic stage, every politician is a perfect performer. Politics was the focused theme here. Later on, I tried self and self-identification in *HER* and *ME*; existence crisis in *HIM*; affection in the relationship in *YOU*; and environmental crisis in *US*. Self and self-identification (Figure

Figure 3.7: 50*40cm mixed material painting *HER*.

3.7) was the theme that emerged at the end for *NOTMASKII* which evoked for me a strong emotion and had the most resonance and relevance to my situation. *HER* showed two anthropopathic images which blur the difference between seen and unseen. The idea of this painting came from my life experience since I had moved from China to the Netherlands: emotions and feelings are ambiguity on each face I have seen every day. The ambiguity emotions and feelings were making me being lost in the foreign culture which, in the end, led to my growing wish to create this work - about the conflicts and emotions through seeing this "real" performance in my daily life.

3.3.3 Story

The filmed materials from Participatory performance were narrated in the film *WHO*. Editing the film *WHO* was an approach of manipulating and constructing the *Story*. Every frame in *WHO* had two screens. Both showed how the visible and invisible performance was blurred. The left screen was always showing the dramatic performance on the stage by a performing-participant; the right screen was shifting from what the participant was seeing through the mask, and what the camera (as a spectator) was seeing (Figure 3.8).

The biggest struggle in the design process of *NOTMASKI&II* happened at the moment when I had to narrate the *Story* in
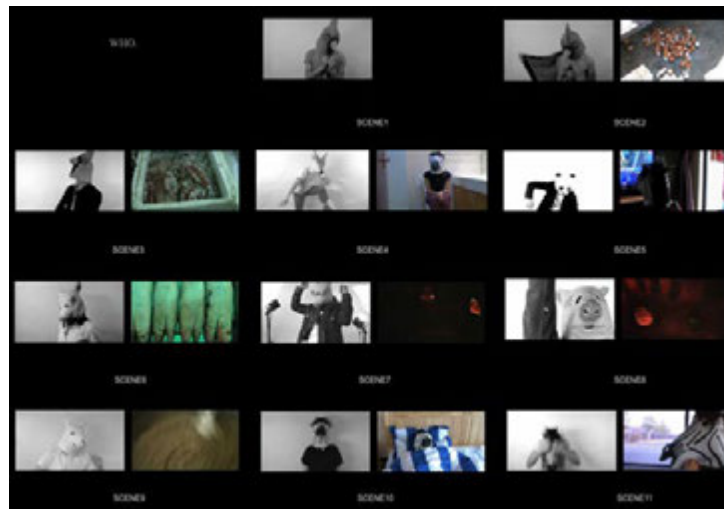
Figure 3.8: Eleven different scenes were narrated in the film *WHO*.

NOTMASKII. The abstract and symbolised story in the *NOTMASKI* contained a large number of different scenes. At the end, I selected one scene (SCENE 7, Figure 3.8) from the performances which had a strong logic of action and reaction as a reference for building up the *Story* in *NOTMASKII* - you are looking in a mirror as you are looking at the mask.

3.4   NOTMASKII

3.4.1 Designing Experience for NOTMASKII

NOTMASKII used a dark space in which the audience could move around freely. In *NOTMASKII*, the experience was designed based on the motion detected by a Kinect[4] camera which faced the audience directly to capture the motion. Processing[5] was used to detect motion and generate projections. A projection screen and a full HD projector were installed. The distance between the participant and the screen, the position and the movement of the participant were determined by the technical constraints of the Kinect camera. *NOTMASKII* was aimed to enable the audience to "*become a part of the happenings and simultaneously experience them*" (p.128, Goldberg, 1988) in which they started to play a vital role in Interaction.

Gustave Le Bon states, "*to know the art of impressing the imagination of crowds is to know at the same time the art of governing them*" (p.37, Le Bon, 1897). In *NOTMASKII*, as the participant was moving closer to the screen, the line shown on the screen would grow into a crack, and become larger. The opening and closing of this crack would follow the participant's positions and movements. Frequencies of the participant's movements determined the types of animal masks shown on the screen (Figure 3.9). The background pattern would

Figure 3.9: A participant experiencing *NOTMASKII* .

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4 *https://en.wikipedia.org/wiki/Kinect*, retrieved: 13-3-2017.
5 *https://processing.org/*, retrieved: 13-3-2017.

flow into the crack at the end. The number of the spectators in the interaction area determined the different sizes of the background's pattern and the different time of the background's pattern needed to flow into the crack. Finally, every second the visual output was the image created by both the participant and the spectators when they co-existed together.

3.4.2 Actual Experience in NOTMASKII

NOTMASKI&II was shown at an exhibition[6] during the Dutch Design Week in Eindhoven on October 17th - 21st, 2015. Due to the space constraints and lighting conditions, this exhibition did not include six paintings. The whole stage of *NOTMASKI&II* was around 10m^2. One 25-inch TV screen was used to loop the film *WHO* on a table covered with exhibition posters, as the first part of the exhibition that the audience would encounter. *NOTMASKII* was installed next to it. The *NOTMASKII* area included a long table also

Figure 3.10: *NOTMASKI&II* at the exhibition during the Dutch Design Week on17-21 October 2015 in Eindhoven. Top: a schematic view from top. Below: exhibition photos.

6 Available at: *https://vimeo.com/142871648*, retrieved: 23-5-2016.

covered by posters and a projection screen (2×1.5m). The speakers and the projector were hidden under this table, and the Kinect was put on the right-up corner of it. This table divided the *NOTMASKII* area into two parts: the projection screen was at the left side and the interaction area at the right. Behind the interaction area, the six animal masks used in this project were hung from the ceiling (Figure 3.10).

The interactive installation *NOTMASKII* offered the audience an opportunity to become actively involved in the creative process by influencing the image output. Each image was determined by the individual action. While the audience became the participants and saw the results of their actions, they simultaneously saw themselves in the form of a projected image. The participants were not only the creator of their experiences, but they were also the content of the work. For instance, when a young lady was waving in the front of the screen with open arms and swinging around in circles, the speed of her performing movements altered rapidly the density and speed of computer-generated images. However, this particular realisation only existed because of this particular performance. In another example, two men were coming together. The older was standing outside the Kinect detection area. The younger one was moving with small movements from side to side, and the speed of generated images was almost frozen. They were talking about what they saw and how they were confused (Figure 3.11).

NOTMASKII was not just a screen-based installation designed to present pre-set content but offered an experience with "*a tight feedback loop of action-results-modified-action-modified-results*" (p.4, Winkler, 2000), where each chain in this loop was interdependent. The actual experience was brought into existence only with the help of each chain within this feedback loop. Moreover, *NOTMASKII* had a significant impact on the audience perception. The participants - consciously or unconsciously - became creators, performers, and finally content in this work. Their participation created a different
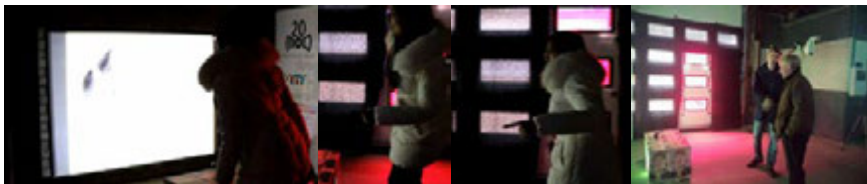
Figure 3.11: People interacted with *NOTMASKII* with different behaviours. The left three images: a young lady was waving in the front of the screen with open arms and swinging around in circles. The right image: two men were coming together. They were talking about what they saw and they were confused.

actual experience for themselves and for the spectators as well.

3.5   DSPI in NOTMASKI&II

As mentioned in section 3.3.1, the connection between *NOTMASKI* and *NOTMASKII* helped me identify pieces of the experience that belonged to the interactive art genre. *NOTMASKI* departed from Participatory performance. During the design process, Participatory performance had been used to serve as a means of forming the content and constituted an integral part of interactivity in *NOTMASKII*. The process of creating *NOTMASKI* helped me to complete metaphor, emotion, conflict, and theme in *NOTMASKII* (section 3.3.2). The component *Story* in *NOTMASKI* was broken into several smaller pieces. Based on the formed *Drama*, one of these pieces was selected as the *Story* in *NOTMASKII* (section 3.3.3).

If I look back at the whole process of creating *NOTMASKI&II* (Figure 3.12), parts of the component *Drama* (metaphor, conflict, and emotion) were formed during the exploration of Participatory performance earlier. The themes were identified with the drawing practices. The *Story* was developed into the details of visuals in the process of creating the desired experience for *NOTMASKII*. In the end, *Production* unfolded the interactivity in front of the audience in the development of their actual experiences at the exhibition.
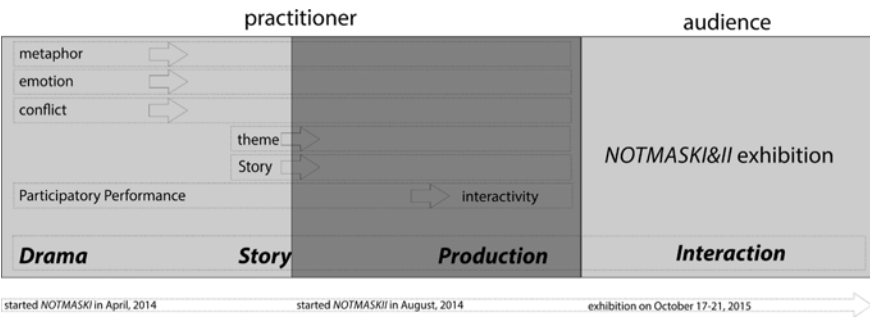
Figure 3.12: DSPI in *NOTMASKI&II*.

3.6   Reflection

NOTMASKI&II is a multidisciplinary project working with artistic explorations and spans over the discipline of interactive art, drawing, photography, film and performance. In this section, I will discuss how I coped with the relationship with my audience through three forms of negotiation in this design process. The reflections will give insights of DSPI when being used for designing interactive installations. The achievements and the limitations with the current implementation will open new possibilities for Cycle 2.

3.6.1 Intent and Intent Transformation

NOTMASKI was a process to clarify my original intent from ambiguous thoughts, and several performing-participants were invited into this process. In *NOTMASKI*, the intent was ambiguous and opened to different interpretations, rather than being fixed or determined. Nevertheless, going through a process in which the performing-participants were co-creators, the intent could not be developed into *Drama* without compromising on my part as a practitioner. For example, during the performance, once I hoped the performing-participants could think about charging the mask with new meanings, anthropomorphized animals, for instance. The participants were thinking of something entirely different, such as starting to perform a lazy rooster. When designing the *NOTMASKII* installation, this strategy also allowed the individuals who interacted with the installation to have their interpretations. The interpretations of *NOTMASKII* relied on behavioural reactions of participants and spectators together. *NOTMASKII* was becoming not just a pre-determined work.

I received feedback from the visitors at the exhibition. What they saw was "just like what it is". However, still, a researcher from Delft Technology of University mentioned that *NOTMASKII* reminded her of the novel Animal Farm by George Orwell, in which animals were used as a metaphor of socialism on a farm and each animal represented a part of society (Snyder, 2004). She was wondering if there was a similar metaphor used in my work. Another visitor, a designer from London, commented that she found it was "*difficult to compare the film with the interactive installation as both are using different approaches, if I have to say something, the film WHO at this exhibition is packaged with a lot of information and the interactive installation NOTMASKII is a bit weaker*". The frustration in

understanding the intent by the visitors at the exhibition produced the different interpretations to conclude this work. Compared to *NOTMASKI*, *NOTMASKII* was composed in a way that the intent became abstract and less direct. Therefore, viewing *NOTMASKII* was different in its context where the transparent and indirect intent led to some problems on the perceptions of visitors. These problems consisted of two primary aspects. The first was that the algorithm used in *NOTMASKII* to generate position and movement data, in my opinion had thrived on the degree of information loss. The second was that I had to simplify the intent to make the logic of the "*action-results-modified-action-modified-results*" (p.4, Winkler, 2000) loop more direct and understandable for the visitors at the exhibition.

3.6.2 Desired Experience and Actual Experience

The exhibition demonstrated how a desired experience was falling into the actual experience on the level of behaviours and under-standings. However, the negotiation between desired experience and actual experience reflected the steps in DSPI. I summarise the insights into two points: (1) the design of interactivity in *NOTMASKII* was generated from Participatory performance. This strategy was a way to incorporate agreements on the negotiation between the desired experience and the actual experience in this project; and (2) the actual experience in *NOTMASKII* was context-dependent rather than being an end result in DSPI. The actual experience could serve as criterion and inspiration for future developing the desired experience. In this project, the empirical evaluation of the actual experience lacked at the final exhibition. How to develop the desired experience based on the evaluation of the actual experience seemed to be the biggest limitation and challenge at this stage.

3.6.3 Installation-Audience Relationship

As a work of exploring the installation-audience relationship, *NOTMASKII* offered an exchange of roles between the participants and the spectators through its interactivity (section 3.4.2). *NOTMASKI* was thus a documentation of Participatory performance and a reference for a live participant in *NOTMASKII* through interactivity. Interactivity was brought in one context and realised in another. This caused the problem that the installation-audience relationship in *NOTMASKII* was the meeting of two different

contexts, which might or might not intersect. For example, the rooster mask was defined its meaning and behaviour in the context of the group performing participations, the audience in the context of final public exhibition might feel confused about the visual output during their experience (e.g., one from the audience commented: "*why my mask is a rooster not a pig or something else?*" Another commented: "*why my mask is always a rooster, can it change into something else?*"). The pre-set interactivity in *NOTMASKII* stopped the dialogue between the installation and the audience in a short time. In light of these limitations, I considered that some approaches - such as using a growing interactive system (Fisslinger, 1998; Sommerer et al., 1999) or providing points of entry to access the narrative (Mura, 2010) - could offer the different degrees and types of participation in an interactive experience which might benefit the installation-audience relationship.

Acknowledgements

REFLECTION ON CYCLE 1

Cycle 1 explores the process of using the DSPI framework to design interactive installations. The practitioners may start with a vague idea and an abstract intent (in project *NOTMASKI&II*) or a given theme (in workshop Interactive Patina of Culture). They may invent more elements when storying a desirable experience which help them to transform the intent. The practitioners leave *Interaction* on the stage which fully involves the audience. The audience approaches the experience when they are seeing, feeling, and interacting with the installation. They may recognise the metaphors or roughly understand what this installation is about when they are immersed into the installation, whereas they may or may not fully touch the *Drama* (Figure 2.5 and Figure 3.12). To some extent, this cycle shows the importance of *Drama*. The results from both the workshop Interactive Patina of Culture and the project *NOTMASKI&II* show that starting with a *Drama* and anchoring in the *Drama* help the practitioners know how to start and where to continue when they need to design an interactive installation. *Storying* a desirable experience enriches the *Drama* and realises the *Drama* into a *Production*. The degree of effectiveness in the *Production* influences how the *Interaction* will deliver in the actual experience.

At the end of this cycle, based on the patterns that emerged in both the workshop Interactive Patina of Culture and the project *NOTMASKI&II*, at this point, the DSPI framework can be summarized an approach is as follows: *Drama* is a given expressive component including four elements - metaphor, conflict, emotion,
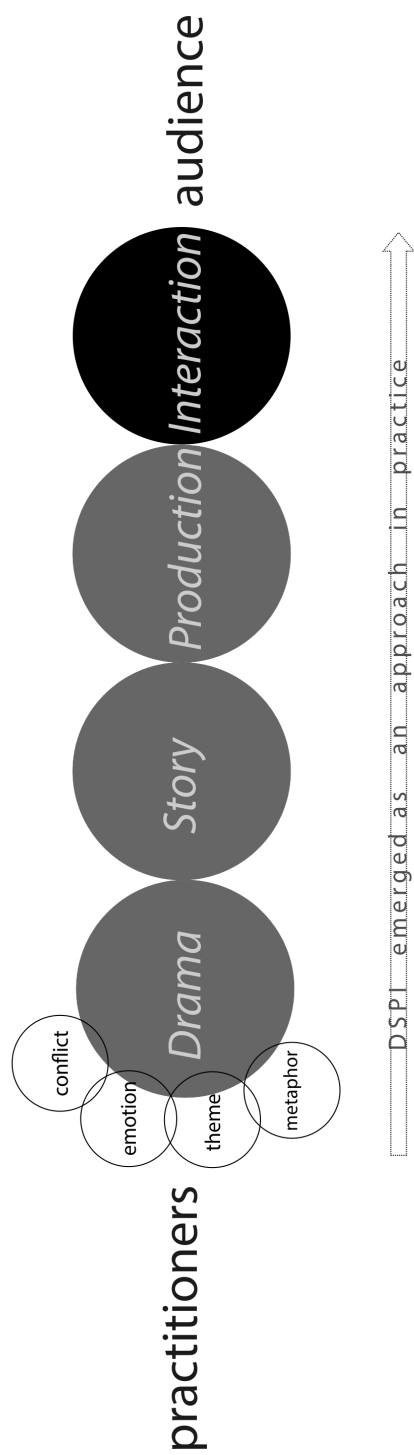
Figure 3.13: The DSPI framework as an approach at the end of this cycle: from *Drama* to *Story*, from *Story* to *Production*, from *Production* to *Interaction*.

and theme. These elements are carried and developed into the resulting *Production* by storying a desired experience. The component *Production* and its elements - physical form and interactivity faces the audience directly in *Interaction* as the actual experience unfolds (Figure 3.13).

The next cycle serves as a perspective for the use of the DSPI framework that starts from the component *Drama* and goes through the steps of from *Drama* to *Story*, from *Story* to *Production*, from *Production* to *Interaction*. An evaluation of the audience experience will also be applied in the design process to help the practitioners understand their design results better.

i want tail #08 twenty-one heaviest words (2017)

installation/performance

i want tail #08 twenty-one heaviest words (2017)

installation/performance

CYCLE 2

START FROM DRAMA
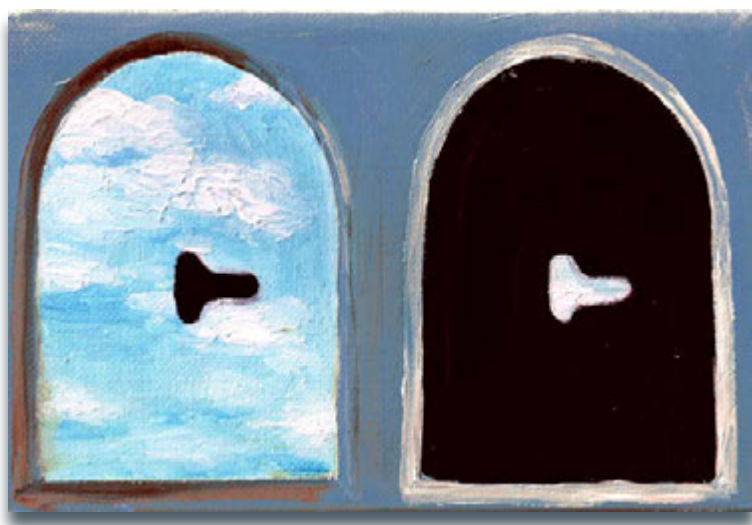
i want tail #05 tail on those windows (2017)

*18*12cm*
oil on canvas

CHAPTER 4

REPLICATION

"*I don't define the relationship in terms of art and life, us and them. I don't see it in this kind of black and white way. I would like to redefine how one looks at the way art and the way life could be – and I could introduce other things into that relationship... Let's say from other social and political situations that I am involved in. I would say I definitely am interested in blurring the line, in terms of how art is perceived, in terms of how one approaches what is deemed to be art and the possibility of treating it in another way.*" (p.1, Barak, 1996)

- Rirkrit Tiravanija

4.1   About this Chapter

This chapter describes the use of the DSPI framework in two versions of the interactive installation *REPLICATION* with a particular focus on the difference in their contexts. The second version of *REPLICATION* was developed based on the results of and lessons learned from the first version of *REPLICATION*. *Drama* as a starting component had driven both versions of *REPLICATION* from the intent to the audience's physical and emotional engagements and critical thinking skills. Through *storying* a desired experience, setting up *Production* and observing the actual experience in *Interaction*, the practitioners used the linear DSPI approach.

Both versions of *REPLICATION* and their separate exhibitions are presented in sections 4.2 and 4.3. Section 4.3 also describes the actual experience of the second version of *REPLICATION* with the analysis of the feedback and observations from the exhibition during Dutch Design Week 2014. This chapter concludes with a discussion about the use of DSPI in these two versions of *REPLICATION* (section 4.4) and the reflection on the three forms of negotiation between the practitioners and their audience (section 4.5).

4.2   First Version of REPLICATION

The initial version of *REPLICATION* (Marinkovic et al., 2014a) was the result of an international workshop hosted by Science and Education Newtown in Taicang, China from April 7th - 18th in 2014. The theme was Interactive Patina of Culture and it aimed at creating interactive installations in the context of Chinese culture. In this workshop, the student groups started with formulating the *Drama* first and then following with the process - from *Drama* to *Story*, from *Story* to *Production*, and from *Production* to *Interaction*. The initial *REPLICATION* was voted as favorite project at the workshop exhibition and was selected to be further developed for Dutch Design Week 2014. In the following, the first version of *REPLICATION* is described, together with an argument why it was not sufficiently developed according to the DSPI approach. The second version of *REPLICATION* will approach the challenge differently and show better results compared to the first one.
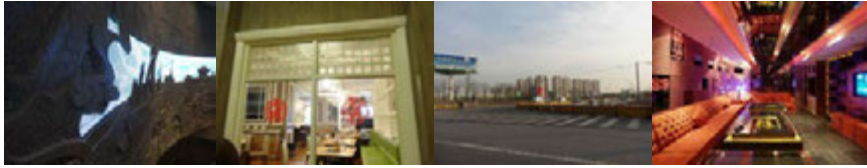
Figure 4.1: From left to right: in Taicang Museum, a high-tech digital screen was installed underneath an artificial plastic board full of traditional Chinese patterns; a restaurant in Taicang had the combination of mixing the Chinese and Western styles in its decoration; the developing area in Taicang was occupied by the Western style buildings; and an equipped KTV room in the city center of Taicang used traditional Chinese patterns as its decoration. (photos by Emilija Marinkovic, Jiali Tang, Xiaoyun Zhang and Yuyuan Zhou)

4.2.1 DSPI in First Version of REPLICATION

In the first phase of the workshop, a group of students started by observing and experiencing the local culture to gather inspiration (Figure 4.1). The first impression for them was "*the Western influence on China is big and is getting bigger in the Chinese daily life, and the Chinese have adopted Western influences and made them their own*" (Marinkovic et al., 2014b). They also found that "*in China, in pursuit of higher living standards and losing trust in local products means local Chinese are looking to international brands more. The buying power of the Chinese is serving as a driving force behind changes in their behaviour and lifestyle*" (Marinkovic et al., 2014b). In addition, this student group conducted interviews as the second step in which they wanted to know how the Chinese thought about the Western influence. During the interviews, people in the neighbourhood were asked what they liked about Western culture. Their responses were all about the freedom, open-mindedness, advanced technologies and progressive ideas. This student group concluded in their report that "*China's love for the Western, especially the United State that the Chinese admire the American style*" (Marinkovic et al., 2014b).

After the interviews, this student group described the four elements within *Drama*:

"*Emotion: a general feeling of self-awareness;*

Metaphor: selected logos from the Western commercial brands;

Theme: interactive patina of culture;

Conflict: Western and Chinese culture in the context of China." (Marinkovic et al., 2014b)

The student group explained their *Drama* further as follows: "*the*

Figure 4.2: Left: A person in traditional Chinese clothes is working in the environment with all kinds of traditional Chinese architecture. The scene presents that working in this environment creates a lower income. Right: The same person in U.S. brands is working in the environment with high Western-style skyscrapers covered with popular Western logos. This scene presents that working in this environment creates a higher income. (images by Emilija Marinkovic, Jiali Tang, Xiaoyun Zhang and Yuyuan Zhou)

keyword for our Drama is 'Replication'. The Drama revolves around the idea that China is replicating the West, in particular, America. This is based on the assumptions that the Western way is the best way because being Western means that you are developed. Therefore, copying with the Western way means a greater amount of wealth. By doing this, the Western culture is creating a new patina on top of Chinese culture. We would like to create awareness. We want people to realise that the West is being replicated and to ask themselves whether this is good, whether they really want this and what this means for their own individuality and culture" (Marinkovic et al., 2014b). The logos of global commercial brands were chosen to symbolise their statement. This *Drama* illustrated the position that consumption and culture play where China always walks in the shadow of the West. Copying the Western symbols of status and culture had been superficially understood as the superiority of power, wealth, and status (Figure 4.2).

The first version of *REPLICATION* storied a desired experience: When the audience walked past the installation, the audience members would realise that they were being projected onto a grid. There were multiple screens in this grid. Each screen replicated the audience's movements and behaviours over a certain period of seconds. As the replication of the images went on, the images generated from the audience started to distort or degrade. This symbolised the lower quality of the replicated items. There was also a layer of Western logos pervading the background. It implied that the Western influence was having over modern Chinese culture. The desired experience in the first version of *REPLICATION* was to satirise the cultural situation in a specific context, challenging the

Figure 4.3: The first version of *REPLICATION*. (photos by Emilija Marinkovic, Jiali Tang, Xiaoy-un Zhang and Yuyuan Zhou)

audience's views of their own culture and, in particular, triggering a reflective state of mind.

The student group used cardboard to model an upright-standing tiled geometric surface and designed the interactivity based on this physical form (Figure 4.3). The Production of this *REPLICATION* was as follows: The scale of the physical form was 40×30×5cm. For the interactivity, a fixed camera captured the audience's video images and projected the images onto different facets of the tiles using Projection Mapping techniques. Visual output was projected with one second of video delay between each tile, which created a scattered, time-fragmented impression of a mirror. A layer of colourful logos from well-known global commercial brands was projected on top of the video tiles, flowing randomly without any geometric correction. The audience would approach the surface and eventually stand in front of the camera. Their video images were projected onto the surfaces overlaid by floating logos. The audience's movements were being translated slowly throughout the different projection tiles.

4.2.2 Reflection on First Version of REPLICATION

The first version of *REPLICATION* was exhibited on April 18th, 2014 at the workshop exhibition in Taicang, China. The result showed the actual experience was different from the "desired" one. The audience walked past the installation, and most of them were attracted by the colourful logos. Some of them even did not realise their images were underneath these logos. Some found themselves being projected on the surface in a grid of videos when they were close to the installation. Because of the quality of video images, they did not realise that their video image tiles were replicated and delayed in-between all tiles.

We observed the followings from this exhibition: (1) while the

first version of *REPLICATION* was fully working, lighting in the presentation space was too bright and the camera could not produce clear and high contrast video images; (2) the floating colorful logos filled the entire surface of this prototype and overlapped too much the under layer of projected video feed that looked comparatively very weak; and (3) the audience was attracted by the colors, but they saw it more as entertainment. They did not realise that the design of the colourful logos and the video images had a hidden intent.

The conclusion might be that in this version of *REPLICATION*, the *Production* did not serve the experience. For example, the audience did not recognise that the video images of themselves were degraded through video effects in each projected tile, and the replication was meant to symbolise the lower quality of the replicated items compared to the original. However, the concept of using replicated and delayed video feeds offered the interesting results. Therefore, the first version of *REPLICATION* was considered to have a potential to be adapted and developed further for exhibition at the Dutch Design Week 2014 with the intent to go through the *Drama-Story-Production-Interaction* approach again. Given the circumstances, the physical form and interactivity were suggested to use as a tool to support the delivery of the intent and a desired experience. The remake would focus on the different context and the quality of *Production* to reach the actual experience as close as intended.

4.3   Second Version of REPLICATION

4.3.1 DSPI in Second Version of REPLICATION

When the first version of *REPLICATION* was presented in China, the *Drama* revolved around the context that China was culturally replicating the West. The remake of the new version was aiming at an exhibition in the Netherlands. In this new situation, the audience and the context were different. The conflict embedded in the *Drama* was shifted from Chinese culture to general daily life - many activities in our daily lives have a replication on which our immediate effort and actions could have an impact. Further investigation was about how culture in general and interactive experience could be combined together. The issues of tangible culture and intangible culture (Nakatsu et al., 2015) were considered at this point. The theme was still Interactive Patina of Culture. Emotion in the new *Drama* was still the sense of being awareness, whereas Western logos as a

Figure 4.4: Production of the second version of *REPLICATION* in the vision lab in the main building of TU/e.

role of metaphor were removed from this new context. Aiming at a real-scale installation, uniform tables, and repetition of using such tables - an example of global expansion - was considered as one way to symbolically represent "replication". This led to a new narrative of *Story*: what the audience do impact what they see. Creation is one possible result of being replicated. The balance between replication and creation was broken by the participants themselves, by the time and the movements they offer. The spectators and the given environment influence the behaviours.

In the process of remaking *REPLICATION* into a new *Production*, focus was more on the quality of both physical form and interactivity. A scale model was built in a vision lab to test the interactivity (Figure 4.4). The visual output was inspired by the famous artwork *Marilyn Diptych* (Warhol, 1962) which was based on "*icons of famous American products and celebrities*" (ART EXPERTS, 1999) to "*explore the relationship between artistic expression, celebrity culture, and advertisement that flourished by the 1960s*" (ARNDT, 1999).

The available exhibition space in Schellensfabriek for this installation was approx. 20m^2, including a central space for the audience on the ground floor (16m^2) and the area for setting up the equipment on the second floor (4m^2). This space determined the physical form of the second version of *REPLICATION*. The main part of this *REPLICATION* was built with over 80 uniform tables. In addition to this comparatively large-scale physical sculpture, a small video camera was put inside a transparent plastic sphere (20cm-diameter), hanging from the ceiling in front of the tables sculpture using a spring. The position of this camera ball was one meter away from the

Figure 4.5: The second version of *REPLICATION*.

table sculpture and a spotlight from the top marked this camera area as the stage for the public to interact with the installation (Figure 4.5, right). Video images captured by the camera in the ball, for instance, from the participants' faces, were projected onto the sixteen selected table surfaces. These sixteen projections were shown with a delay one after another, so the audience could see their facial expression making its way through sixteen projection surfaces one by one. Each projection was processed in a different way according to the timed delay and the audience's movement. The movements with small changes and efforts resulted in a progressively bland, colourless and disintegrating image. Big movements caused colour effects which were more colourful and vibrant (Figure 4.5, upper left).

4.3.2 Feedback at the Exhibition

The second version of *REPLICATION*[1] (Figure 4.6) was installed and exhibited from October 18th - 26th in 2014 during the Dutch Design Week 2014. We wanted to know more about the audience's understandings of the installation. We were interested not only in the single interaction, but also in group dynamics. We decided to randomly select individual visitors and family groups for interviews after they interacted with the installation. The interviews were conducted in English.

During the exhibition, we conducted sixteen interviews. The interviewees included six males, eight females, and two family groups aged from 4 to 70. All of them were Dutch. After they had interacted with the installation, they were first interviewed about their attitude

1 Available at: *https://vimeo.com/150888556*, retrieved: 23-5-2016.

Figure 4.6: A visitor interacting with the second version of *REPLICATION*.

towards arts, whether they tried interactive installations before. In general, except three boys who were younger than 10, all the other interviewees had experiences with installation art before, and had certain experiences with interactive products, while only one of them could recall a particular experience with interactive installations in the Ludwig Museum in Cologne. Moreover, interviewees' attitudes towards arts were varied: some went to art museums quite often and some were not particularly interested in art.

Afterwards, we asked a set of questions in an open interview. These questions were designed to directly related to the *REPLICATION*:

(Q.1):"Do you experience that you could influence the REPLICATION in any way?"

(Q.2):"What do you think about the effect of images?"

(Q.3):"Could you feel the REPLICATION is trying to express something? If could, what it is?"

(Q.4):"What is the REPLICATION according to your view?"

Sometimes discussions arose rather than mere replies to questions. The interviewers transcribed the interviewees' answers during the interviews. The interview results showed a positive interactive experience was mainly characterised by the interviewees themselves. For Q.3 and Q.4, most interviewees (11 for Q.3 and 15 for Q.4) could not give their own opinions, while they mentioned that the verbal

text introduction of the installation was helpful to understand the concept of the installation. More than half interviewees (9 of 16 interviewees) gave positive comments on the whole *Production* of *REPLICATION* (Q.2). The rest seven interviewees said the lighting of exhibition space was too dark to see the video images. Twelve interviewees were enjoying their experiences of *REPLICATION* (Q.1), and the rest four interviewees (all between 30 and 40 years old) were not so happy with their interactivity while being content with their overall visiting experience, which could be explained by their difficulties in acting in front of the public. Although they did not have any comment on the relationship between the setup and the core concept. In contrast, kids, teenagers, elderly and family groups interacted much more actively with the installation. Interviewees reporting what they had observed from the others used expressions, such as "*they were playing like children, it is a wonderful thing*", "*they were playing, they were so funny, they were shooting photos all the time*", and "*they feel playful*".

Summarising the results of these interviews we could conclude that, with *REPLICATION*, the intent was not fully understood by the individual interviewees. However, through interacting with the installation, the interviewees produced their understandings. The interactivity of an installation had a central role in the actual experience but also in the experience that the interviewees observed from the others in the same space.

4.3.3 Observations at the Exhibition

The second version of *REPLICATION* was considered to develop a critical awareness of the conflict between "replication" and "creation" in the new context and to evaluate the experience of the visitors at the exhibition. Overall, staying together with other static products with the labels "PLEASE DO NOT TOUCH", the installation had the unexpected difficulties in encouraging people to interact with it. Putting a label "PLEASE TOUCH THE HANGING BALL" at the installation was the last thing we wanted to do. Although we had added a spotlight on the camera ball, the interactivity of this installation was still hardly visible for the passersby. Under such circumstances, the visitors at the exhibition were guided and encouraged to interact and shown what to do, given hints about what to expect, and sometimes told the limits of the installation. Also, the text introduction placed at the installation played a major role for the visitors.

Figure 4.7: The participants interacting with the *REPLICATION* at Dutch Design Week 2014.

However, the observations at the exhibition still surprised us in what the relationship between the visitors and the second version of *REPLICATION* was (Figure 4.7). The visitors were often careful and curious about "what's going on here" in the beginning. After they had tried for some time and got the idea of "how it works", they started to be very creative in exploring the installation. They were either pulling the camera ball to see how far it could go, or playing the camera ball as a bouncy ball to see the fast-moving images on the table sculpture. The elasticity of the spring made the camera ball dance easily, like having a life of its own. The flexibility of the spring also increased the area that the camera ball could reach. The visitors played with this ball: tightly rubbing their faces, clothes or bags against the ball, pulling the ball to their friends' faces, or turning it towards the empty space around them.

We also noticed that during the whole exhibition, the adults rarely approached the installation by themselves. However, once they tried, they usually were amazed by the visual effects and the interaction with the camera ball. The children usually went in groups or with families. They were usually eager to try out themselves once they had seen someone else interacting with the installation.

4.4   DSPI in Two REPLICATION Installations

It is unfair to compare these two installations. The first version of *REPLICATION* was accomplished in less than two weeks by four students whereas the second version of *REPLICATION* was made in more than three months with the help of over ten volunteers and experts. However, the DSPI approach was structured clearly in the design process of both versions of *REPLICATION*. Two REPLICATION installations used the different *Story* and *Production* to deliver the similar sense of *Drama*. The observations and reflections from the workshop exhibition in the first version of *REPLICATION* offered the possibilities for the practitioners to improve their design in the remake of the second one. The interview results, observations, and reflections from the exhibition of the second version showed DSPI could help the practitioners to design the experience closer to what was intended (Figure 4.8).

From the perspective of three forms of negotiation, the following section will unfold how DSPI helped the practitioners design experience for an interactive artwork during the design process.

first version of REPLICATION

second version of REPLICATION

started in June, 2014   exhibition on October 16-26, 2014

started on April 7 , 2014   workshop exhibition on April 16, 2014

students   practitioners

Chinese audience   International audience

Drama   *Story*   *Production*   *Interaction*
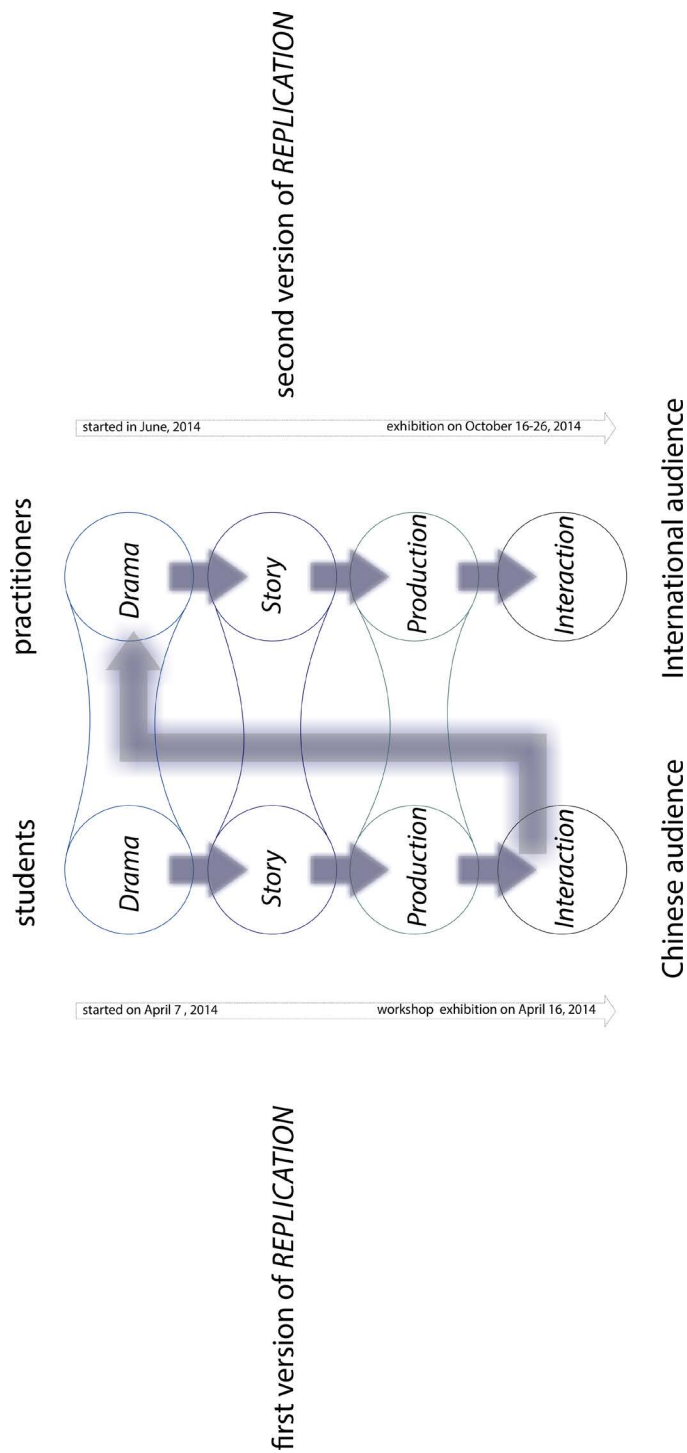
Figure 4.8: The DSPI framework as a continuing loop in the process of designing two *REPLICATION* installations.

4.5   Reflection

4.5.1 Intent and Intent Transformation

In general, the practitioners who create the installation have a very explicit communicative aim. There is something - definable or describable - that the practitioners want to convey to the audience. If conveying the information is the sole aim of the practitioners, they only need to produce a direct message instead of a complex abstract installation. For instance, in the second version of *REPLICATION*, most interviewees always overlooked the intent behind this work (section 4.3.2). We could produce a text as "Dear people, in China, there is this cultural trend about the West…" We did not want to do this because we did not want to simply inject a direct message into the heads of the audience. Therefore, there is a real gap existing, and the existence of the gap is part of what makes the installation into what it is (in fact the installation should not be closed so much as played with, which was exactly what our final installation did). During the design process, the intent was being transformed through the steps of DSPI. Following this approach enabled the practitioners to see different levels at which the audience were approaching the installation. For the audience who were fascinated by "how" this installation worked, they were seeking for the possibilities of the actions and the changes occurring as the results of the actions. For the audience who were confused by "why" the practitioners made this work, they might be more interested in finding out the hidden intent to answer the "why" question. The true importance of the intent may at times lie more on the levels of the individual experience with the art piece.

4.5.2 Desired Experience and Actual Experience

I acted as the project leader of the second version of *REPLICATION*. In the process, I had to constantly adjust the desired experience on the basis of the specific circumstances: finding a "perfect" exhibition space for the installation and it should not be too expensive; finding a right way to set up the installation for the exhibition in no more than three days; finding a solution to modify the visual output because the exhibition space was still too bright; and finding a not flattering style to advertise this project before the exhibition. In the end, I needed to keep a balance between the "perfect" I wanted to achieve and the reality I had to accept, which might be the most important point I learned in this process. This experience reminded me of an artist

whom I met in Cologne. He told me that after he graduated from the art university, at the first several years, as an artist, he always built the installations with the size no more than 1×1×1m. Only because this was the biggest size which could be put into the trunk of his car, therefore he could save the money for shipping his work. For one piece of art, 1×1×1m could be the limitation of the size, but it never meant the artist could not make a good art in 1×1×1m.

The actual experience might be shifted away from the desired one in the process. The practitioners may struggle between the desired experience and the actual experience. There are two solutions to this problem. The first one is the implementation of the component *Production*. Another is that anchoring in *Drama* can help the practitioners to keep the quality under control. For example, in the second version of *REPLICATION*, uniform tables were chosen as the building material. On the one hand, the tables were cheap, easier to be projected onto, transported and installed, and could be reused in the future. On the other hand, in this installation, uniform tables played a metaphor of cheap repetition in industry.

4.5.3 Installation-Audience Relationship

The interactivity in the second version of *REPLICATION* was not just building a conversation between the audience and the installation. The interactivity also helped establish a dialogue between the participants and the other spectators. The spectators became an influence, which sometimes affected the installation-audience relationship. For instance, how a participant interacted with *REPLICATION* was forming what the spectators could see on the surfaces of the table sculpture. Interacting with the ball was a very tangible and at times intimate experience. The effect of having the results displayed on all the table surfaces publicized the individual experience for the spectators. The second version of *REPLICATION* created a space in which the audience could interact with the artwork individually and also participate through the group observation. The interactivity played a fundamental role in experiencing and interpreting *REPLICATION* by both the participants and the spectators. The interactivity gave rise to various forms of the installation-audience relationship allowing the audience to experience (section 4.3.3).

Acknowledgements

i want tail #02 i want tail (2017)

photography/performance

CHAPTER 5

NATURE

"*When I do art installations just for myself or for museums which won't give everything how to do it, I would start more deeply by myself, so I would find materials, concept or themes which I am thinking about, so there is no one says you should do something like this or that. Because I am totally free, I would start with what I am thinking about maybe I also start with how the space looks like where I do the installation, to look around, to see the atmosphere there, what the materials are in this space, how I can use them, or how I can do something in contrast. However, I can much more go inside. 'Go inside' means to find maybe you would say 'Drama', to find kind of points which really interest me, to find the centre of my work. I always try to find the centre of my work, but I will never find it I think. The process of searching is most important for me, is not the process of building something up, looking, or doing exhibitions. For me, the process of finding something is always regarding what I did before, what was the most interesting of that, where should I go in depth, and what's the true centre of what interests me.*"(8:53 min/47:21 min, Silies and Zhang, 2016)

- Ansgar Silies

5.1   About this Chapter

This chapter describes the process and the results of the international workshop Nature in 2015. The workshop was conducted at Science and Education Newtown of Taicang in China from May 11th - 22nd, 2015. The linear process of the *Drama-Story-Production-Interaction* approach was introduced at the beginning of the workshop. The aim of following the DSPI approach was to guide the design process and complete eight interactive installations.

Continuing with chapter 4 of using a linear process of DSPI in one project, the workshop Nature offers an opportunity to see the generality of DSPI in designing experience in the context of interactive installations. The workshop's aim, participants, theme, project results, exhibition and exhibition results are described in section 5.2. Section 5.3 describes the evaluation of how the students understood and used DSPI in their design processes. Section 5.4 reflects the use of DSPI based on the three forms of negotiation.

5.2   Workshop Nature

5.2.1 Theme

"*Nature is the origin of all life and its representation manifests itself in one of the history's most traditional artistic genres: the landscape picture. In history cartography, the term Terra Incognita designates places which—according to the cartographer—have yet to be discovered but whose existence is surmised. Since the invention of photography, the new practical medium was regarded as a necessary 'documentation device' for explorers and pioneers in the 19th century, an instrument that can realistically capture previously undiscovered exotic tracts of land. Within seconds of something being observed, it became possible to convey impressions, emotions, and situations, consequently shaping information concerning foreign landscapes that were largely composed of images.*" (Mosters, 2015) Inspired by the art exhibition *TERRA INCOGNITA - Contemporary Perception of Landscape* in KIT- Kunst im Tunnel temporary museum in Dusseldorf, this workshop themed in Nature.

"*What a human being can experience in nature is the procedure of realising respect for the overwhelming forces of nature. Interactions and dynamic behaviour from human beings can influence nature as well*

*as nature slowly but certainly, change how human beings understand
and interact. Here certain kinds of transitions are emerging: some are
reluctant and some are forced; some are invisible, and some are deeper;
some result from creativity and some fade away into extinction. We care
about the experiences and results of interaction, and we also treasure
the blur gap between existence and extinction for interaction.*" (Zhang
et al., 2015) Nature, as the theme, aimed to explore ways to turn the
perception of landscape and nature into an interactive experience.
The workshop students were suggested to find the possible answers
to the question relating to the relationship between human beings
and nature in the particular context of Chinese culture.

5.2.2 Aim

Three aspects underpinned the aim of this workshop: (1) how
the students would understand *Drama*, *Story*, *Production* and
Interaction; (2) how the linear process of DSPI would be used in
the students' design processes when creating an experience for
interactive installations relating the audience as intended; and (3)
what other potential uses of the DSPI approach in the design process
could be.

Before the students started, I gave a presentation to explain *Drama*,
Story, *Production*, *Interaction* and DSPI as an approach - from
Drama to *Story*, from *Story* to *Production*, and from *Production*
to *Interaction*. The workshop Interactive Patina of Culture and
the project *NOTMASKI&II* were both given as examples in this
presentation to show the benefits and limitations of using the
four components of DSPI in creating interactive installations. The
practice of making the two *REPLICATION* installations was also
given as a guideline of how to use DSPI in a linear approach. In
this workshop, we gave a clear limitation to the physical form into
a 60×60×60cm box. This strategy was to limit the exploration space
in the physical forms so that the students could have more time for
designing and refining interactivity. After the presentation, a brief of
workshop Nature was presented to the students as follows:

"Drama: Nature (theme); Story: open; Production: technology
limited to one box (60×60×60cm); Interaction: reaching the desired
experience."

The students were informed that the resulted installations would
open to the public at the workshop exhibition.

To achieve the aim, the whole workshop consisted of the following steps:

Step 1: lecture on the theory - DSPI as an approach for creating interactive installations (two hours on May 11th, 2015).

Step 2: Performance session - (1) by only using body, students as groups should perform five selected emotions: Enthusiasm, Elegant, Patient, Arrogant, and Angry; (2) first only by using body and then by using simple hand-made paper props, students as groups should perform five stories based on the five emotions. These stories were required to well describe a plot; (3) the audience had to be involved. Audience experience should be considered as part of the story (four hours on May 11th, 2015).

Step 3: lectures on practical skills - Generative Art, Graphic Design, Projection Mapping and Leap Motion (six hours in total on May 12th, 2015).

Step 4: DSPI led the process of creating interactive installations which themed in Nature (seventy-one hours in total from May 12th to 21st, 2015).

Step 5: Workshop exhibition (three hours on May 22nd, 2015).

5.2.3 Participants

Thirty-nine students from China and the Netherlands participated in the workshop for two weeks. Ten design students came from TU/e[1] had experience in the field of interaction design before. The rest of them came from SDM[2], NUA[3] and HDU[4]. They had an

Figure 5.1: In the workshop, every coach gave feedback to every group at every evening (left) and also joined the group discussion during the design process (right). (photos by Yudan Ma)

1 Department of Industrial design of Eindhoven University of Technology: *https://www.tue.nl/universiteit/faculteiten/industrial-design/*, retrieved: 23-5-2016.
2 School of Digital Media, Jiangnan University: *http://dm.jiangnan.edu.cn/*, retrieved: 05-10-2016.
3 School of Media Art, Nanjing University of the Arts: *http://media.nua.edu.cn/*, retrieved: 05-10-2016.
4 School of Media and Design, Hangzhou Dianzi University: *http://syxy.hdu.edu.cn/*, retrieved: 05-10-2016.

educational background in product design and media art. These 39 students were divided into eight groups, each mixed with the Dutch and Chinese students. Nine coaches from the Netherlands and China also participated in this workshop. They had backgrounds in computer science, interaction design, product design, media art and interactive art (Figure 5.1).

5.2.4 Resulted Installations

The workshop resulted in eight interactive installations. Both installations *Twinkle Wink* and *Humble* were based on the similar *Drama* that the results and response from nature on human activities were seen only over time. These two installations both used the Leap Motion sensor as the input to design consecutive changes in visual output which represented reaction from the installation on the audience's actions. In *Twinkle Wink*, when Leap Motion was registering presence of the hand, LEDs in the 60×60×60cm box were randomly lit up one by one (Figure 5.2, left). If no hand-motion was registered by Leap Motion, bright LEDs were fading back to the shimmering state. In *Humble*, the distance between the hand and the Leap Motion sensor would change the sizes and color of the flower images (Figure 5.2, right).
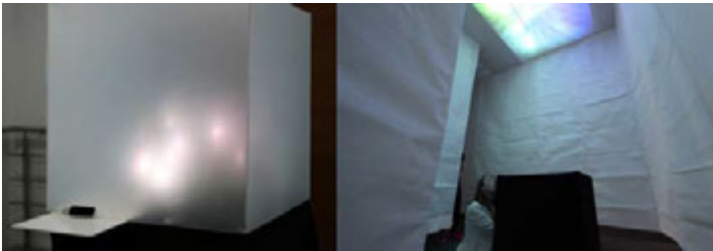
Figure 5.2: Left: *Twinkle Wink*. Right: *Humble*. (photos by Svetlana Mironcika and Fabienne van Leiden)

The Dandelion (Figure 5.3) had a 60×60×60cm box which was made with semitransparent plastic and the natural landscape was projected from the back. The Pyro-electric sensors detected a change in heat levels through the candle. The different heat level influenced
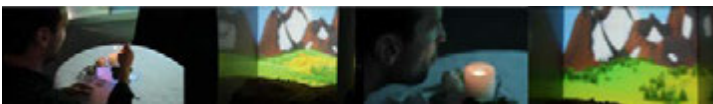
Figure 5.3: *The Dandelion*. (stills from installation video *http://desis.id.tue.nl/2015/06/the-dande-lion-ipoc-taicang-2015-may-group-8/*, retrieved: 05-10-2016.)

the views of the landscape. When the candle was lit, the landscape was showing the desert occupied the forest. When the candle was blown out, the landscape was turning into the view that the trees were growing up again.

In the installation *irespect*, a natural foggy forest scene was built. A lot of leaves were spread on the ground. A 60×60×60cm interactive lighting box was staged in this installation. The audience had to go deep inside the installation space and stand in the centre position after that the interaction would be initiated by the distance between the lighting box and the audience (Figure 5.4, right). When the audience members approached the lighting box from far to near, the light would react and gradually become bright. The installation tried to evoke a respectful conversation between humans and nature through its interactivity. The experience designed in *irespect* conveyed a sense of respect carefully into the audience's mind in this environment (Figure 5.4, left).
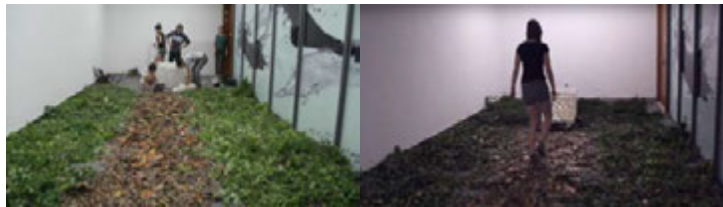
Figure 5.4: *irespect:* proximity sensing for lighting responses in an immersive environment. (photos by Manon Barendse)

In the installation *Inner Peace*, metal foils as a raw material were used to build a starry galaxy environment (Figure 5.5, middle). A 60×60×60cm box was used for the projector in this case. The hand gestures were captured by Leap Motion as input (Figure 5.5, left). *Inner Peace* was aiming at providing a silent dialogue between the audience and the outer space that was full of flashing lights and floating objects (Figure 5.5, right).

Figure 5.5: *Inner Peace*: Leap Motion controller invites the audience to interact with flashing lights and floating objects. (photos by Marieke Acquoij)

Figure 5.6: *Hui.* (photos by Sander Biesmans and Yang Yu)

In the installation *Hui* (回), a 60×60×60cm box was installed as a moving box with a projector inside (Figure 5.6, left). When people moved a circular hand-mill, they could see a microcosm of images of a person's entire life being projected on the wall, from the newborn to the youth, to the middle-aged, to the old age, and to death (Figure 5.6, right).

SOLOS[5] was a 60×60×60cm box full of sand. The participants could build mountains by gathering the sand in *SOLOS*, and they could dig holes to build lakes. The images of mountains and lakes were projected by a projector through Kinect detecting the depth between the sand and itself (Figure 5.7). It required the individuals
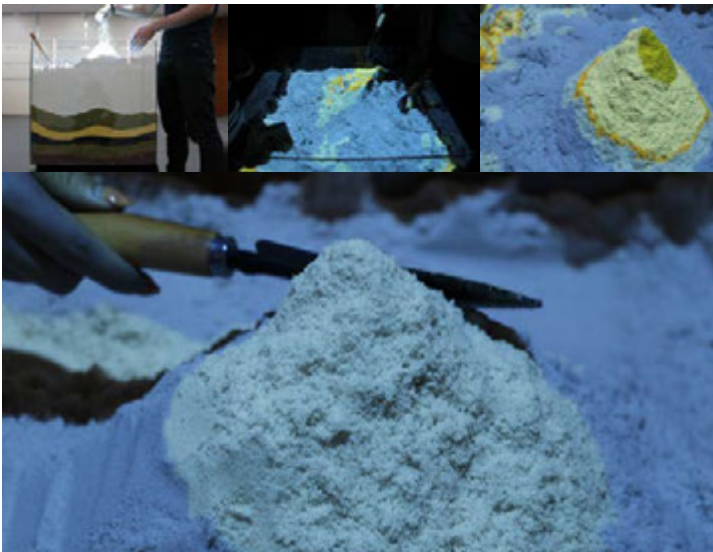
Figure 5.7: *SOLOS*: Kinect-based interaction. (photos by Ruben van Dijk)

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5 After this workshop, we found a similar project *Augmented Reality Sandbox* created by researchers at UC Davis from *http://idav.ucdavis.edu/~okreylos/ResDev/SARndbox/*, retrieved: 02-11-2016. *Augmented Reality Sandbox* was focused on "*being self-contained to the point where it can be used as a hands-on exhibit in science museums with little supervision*".

to compose the experience as a group to use their own shovels to build a nature landmark together.

In the installation *UNSEEN*, the student group used chameleon as a metaphor to explore and represent one of the general personality stereotypes of the Chinese: "*shifting and adjusting into the public, masking oneself, and acting in front of others with the inner feelings and thought either blurred or invisible*" (Jansz, 2015). *UNSEEN* generated a figurative element - chameleon into a specific cultural context with an abstract representation of chameleon's original meaning. It was meant to raise the awareness of such a Chinese stereotype and to open up a question why it exists.

A 60×60×60cm mirror box was installed in a bright, wide-open and empty room (Figure 5.8, left). By creating an environment that would normally be considered too bright and glitter to gaze at, the cube stood out because it was the only object in attention. The experience was designed through a conflict between being part of the crowd when you were outside of the mirror-box and being able to be yourself when you were inside the mirror-box (Figure 5.8, right).

Four iPads were fixed inside the mirror box. These iPads first recorded the view of the participant then played the video back in a loop on four iPads displays until the next person went inside the box.

Figure 5.8: Left: *UNSEEN* and its installation space. From upper-right to bottom-right: both participants and spectators experiencing in *UNSEEN*. (photos by Joch Jansz, Marleen van Bergeijk, Zhen Gong, Xiaochun Ma and Huan Zhang)

When experiencing *UNSEEN*, what spectators around the box could see was only their images reflected in the mirror box. The spectators were the witnesses of the process of the participant's experience. They were watching who would stand out, walk into the centre of the space, go inside the box and become one part of the installation. The iPad cameras played the same role as a mirror in a digital way but with the possibility of reviewing one's behaviour over and over again. What the participant was seeing inside the box which was designed to remain unseen by the spectators.

Later some visitors at the workshop exhibition mentioned "*there is no nature in this installation*" and "*seeing self in the iPads is nothing about nature*". The reason for this misunderstanding (if we have to find a reason) mainly was that *UNSEEN* as the only installation did not go through its visual way to directly connect with nature. *UNSEEN* used a more open and abstract means to explore different natural rules of presence and absence. In *UNSEEN*, both participants and spectators would experience the overlap between seeing and being seen.

In the end, several installations took existing natural elements and made them interactive, using the natural objects as a medium for interaction, for instance, playing with sand in *SOLOS*. Some installations reconstructed the natural landscape in their installation space, such as *irespect*. Through interacting with these installations, the audience could achieve a state of artistic immersion. Some installations used abstract ways to represent the nature, and interactivity in these installations was a means to unfold the rules of nature in front of the audience (e.g., *UNSEEN* and *Inner Peace*).

5.2.5 Workshop Exhibition

The workshop exhibition opened to the guests on May 22nd, 2015. During this time, all eight interactive installations were alive (Figure 5.9).

In the exhibition area, there were six indoor exhibition rooms (with a combined area of approx.350m^2). A series of direction boards ran through the exhibition rooms to guide the visitors. Eight installations differed in space, scale, and lights conditions, supported by posters, concept videos, and introducers.

A one-page exhibition guide together with a two-page questionnaire was given to the visitors before they started (see Appendix 1). The

Figure 5.9: Exhibition Nature. (photos by Yudan Ma)

visitors were advised to visit the exhibition following the suggested path. The visiting path considered the exhibition space conditions. The questionnaire included several topics: the visitors' demographic data (name, gender, age, and background), selection of two favourite installations, reasons of the selection, and comments on the overall exhibition. This questionnaire was intended to evaluate the eight interactive installations from the audience's perspective, aiming at understanding the results of *Interaction* associated with the intent transformation via *Production*. In the end, visitors completed the questionnaire (21 females and 16 males; aged from 19 to 45; all Chinese). The feedback collected from the questionnaires is summarised below.

From the rating result (Table 5.1), the most favoured installations in this exhibition were the installations *Hui* (23 votes), *Inner Peace* (15 votes) and *SOLOS* (11 votes). Additionally, the visitors' comments were made mostly regarding two perspectives: opinions on the

Table 5.1: Rating results from the 37 questionnaire samples in the exhibition and the quotes of the reasons.

Installations	Votes (74 in total)	Quotes of the Reasons
Hui	**23**	"meaningful"; "in-time interaction"; "creativity"; "make me think"; "well-combined technology and production"; "shows the cycle of the whole life"; "deep meaning"; "have a great experience"
Inner Peace	**15**	"impressive visual effect"; "high-tech"; "well-designed interactivity"; "starring effect is very interesting"; "conflict between starring night and inner of me"; "lack of enough logics"
SOLOS	**11**	"play with sand is fun"; "funny and interesting"; "view of nature"
irespect	9	"show the relation between nature and human"; "nice atmosphere"; "impressive installation"; "beauty of having distance"; "reminder me nature"; "natural smell"; "I like distance sensor"
The Dandelion	7	"reflect the nature"
UNSEEN	4	"can go inside"; "can see conflict in the installation space"; "not difficult to understand and to interact"; "not too bad idea"
Humble	4	"good interaction"
Twinkle Wink	1	"representation is a bit simple and direct"

experience in the installations and opinions on the whole exhibition.

Most of the visitors thought that the expression of *Hui* was creative, thought-provoking, and due to its explicit mapping, easy to understand. The visitors could perceive their actions quickly and as a result of their actions, changes occurred. The similar comments were also given to *SOLOS*. The visitors could perceive the visual reactions associated with their actions quickly in *SOLOS*. Both of these two installations had a shorter response time between the audience behaviour and the resulted output than other installations. The other installations had a longer response time, which might have caused a gap between the desired experience and the actual experience. For example, in the installation *irespect*, the visitors had to search for the right position in the dark room before they could interact with the installation. The visitors commented that they "*didn't have enough information to know how to interact*". Next to this, many of the visitors mentioned they liked the spatial solutions when experiencing these installations. Again, in *irespect*, "*the big dark space with the nice strong smell of leaves and full of flowing fog made this installation mysterious*". The same was mentioned in *UNSEEN*, "*the bright, big room with a reflecting mirror box*" was "*the first surprise*" for the visitors. The installations together with the situated environment enabled the audience to walk through and be involved as part of the installations.

For the overall exhibition experience, there were positive comments such as: "*well-combined art and technology*", "*impressive technology*", and "*real technological effects*". The visitors mentioned that technology acted as a driving force for "*the integration of both interactive experience and spiritual experience*". In this exhibition, the visitors thought that their experiences were mostly attracted by the technology used. There might be two possible reasons for this. One was, indeed, sensing technologies were involved in all the installations and experimented to create experiences by the student groups. Another reason was that the visitors to this exhibition had backgrounds that were far away from interaction design or interactive art. Any technology used in this exhibition, even just a simple one (e.g., Kinect used in *SOLOS*), was already "*magic*" to them.

After the workshop exhibition, the student groups were asked to reflect on the workshop by answering two questions: "how do you feel in general about this workshop?" and "how do you feel about the DSPI approach used in this workshop?" In the end, ten handwritten

reflections were collected as text-based data for the evaluation on the use of DSPI in the design process, which is presented in the next section.

5.3 Evaluation on Use of DSPI

The reflections offered an opportunity for me to investigate how the DSPI approach when used by the students. There was a particular focus on how to evaluate DSPI in the ways that better demonstrate its value in terms of understandings and explorations in general. However, before the students started their work, I had given a presentation to explain DSPI in detail. The presentation, on the one hand, helped the students get familiar with DSPI and be able to use it almost immediately. On the other hand, the detailed explanations limited the students in developing their own understanding of DSPI. I saw this as the main reason that in the reflections, there were no particular quotes related to their understandings of the four components and the DSPI approach. For example, no student wrote down what they thought the definition of *Drama* was.

5.3.1 Analysis of Students' Reflections

I gathered ten reflections from the students who used DSPI as a linear process in this workshop. In the analysis of this data, I was mainly interested in gaining insights of how DSPI was understood and used in the process. I analysed the data by using the "*directed content analysis*" method (Hsieh et al., 2005). In this method, "*initial coding starts with a theory or relevant research findings. Then, during data analysis, the researchers immerse themselves in the data and allow themes to emerge from the data. The purpose of this approach usually is to validate or extend a conceptual framework or theory.*" (p.2, Wildemuth et al., 2009)

The quotes were first selected from the ten handwritten reflection reports. The selected quotes were insights directly related to the perspectives of understanding and using DSPI. This led to a collection of 182 quotes, which were short statements (e.g., "*As opposed to standard user-centered design, this process was more self-centered.*") or richer explanations (e.g., "*When I design something from a 'drama', I also have to try to translate an emotion into a rational, concrete product with a function. So in a sense, you give function to emotion.*"). As the second step, a different independent researcher performed

a second round of selection, which led to a final selection of 211 quotes (see Appendix 2).

To find common themes in these 211 quotes, they were used as input for a group clustering session, in which I participated together with another researcher who had not been involved so far in this research. The quotes were printed on small pieces of paper. Two researchers clustered the quotes in a way that it would address the question "How did students understand and use the DSPI approach in their processes?" We first individually made a clustering. After discussing the differences, we agreed with an overview that captured the essence of the data. We concluded that there were two main types of options: "benefits" and "limitations". To provide a valuable overview of the data, we, therefore, chose to cluster the quotes within "benefits" and "limitations".

The "benefits" cluster was further reduced into "communication" (e.g., "*Over time, I realized that this structure was a great foundation of communication.*"), "self-centered perspective" (e.g., "*The DSPI approach taught me how to create an experience for the audience, coming from a deep, inner poetic feeling.*") and "other factors" (e.g., "*I think the design method helps a lot as a guideline for us to build an installation.*").

The "limitations" cluster was further clustered into "linear process" (e.g., "*The design process is strictly linear.*"), "transition difficulties"
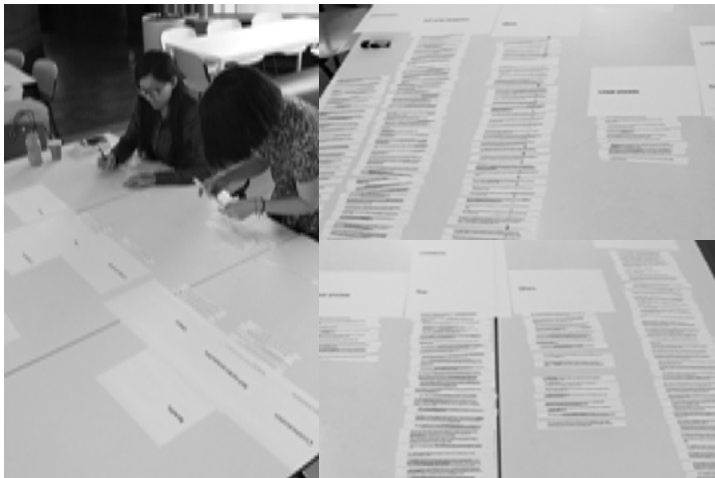
Figure 5.10: Two researchers as coders clustered the quotes into clusters ("benefits" and "limitations") and sub-clusters ("communication", "self-centered perspective" and "other factors" are in the "benefits" cluster; "linear process", "transition" and "other factors" are in the "limitations" cluster.)

(e.g., "*In working with the framework the translation from drama-story towards production-interaction turned out to be quite a step.*") and "other factors" (e.g., "*It will be more practical to think more about the audience.*").

To determine the reliability of the clusters and sub-clusters that were established in the group clustering session, two coders clustered all 211 quotes according to these clusters and sub-clusters (Figure 5.10). The clustering of the quotes were discussed. As a result, some quotes were moved between clusters to resolve inconsistencies.

5.3.2 Findings

In this section, I will present the in-depth findings of the analysis.

(1) What were the benefits when the students used the DSPI approach in their design processes?

Table 5.2: Three sub-clusters of "benefits".

Cluster of "benefits"	Quote number (see Appendix 2)	Total (N=211)
Communication	2, 3, 4, 6, 8, 13, 28, 30, 54, 56, 61, 65, 80, 82, 85, 108, 109, 111, 147, 151, 169, 182, 184, 204	24
Self-centered perspective	15, 18, 21, 23, 24, 25, 26, 32, 37, 38, 45, 46, 52, 53, 60, 66, 67, 68, 70, 72, 77, 81, 92, 94, 98, 101, 102, 103, 104, 105, 110,113, 116, 129, 130, 132, 134, 137, 144, 145, 158, 161, 162, 164, 172, 177, 192, 196, 197, 199, 203,	51
Other factors	5, 9, 10, 19, 33, 86, 87, 97, 106, 119, 123, 127, 128, 136, 137, 138, 141, 142, 150, 170, 171, 178, 185, 189, 198, 201, 206, 207	28

Three sub-clusters of benefits were identified that the DSPI approach might have in students' processes (Table 5.2).

(a) Communication

DSPI seemed to benefit the communication in the group cooperation. DSPI opened conversations towards deep insights in the group. It helped keep up the collaboration in a multicultural and interdisciplinary group. In this cluster, 24 out of 211 quotes were found.

(b) Self-centered perspective

Another factor that seemed to benefit the students' working progress

was the new perspective of "*a self-centered starting point*". In this cluster, there were 51 out of 211 quotes.

(c)   Other factors

Twenty-eight quotes indicated other factors that can benefit the students. These quotes showed that the DSPI approach might help the students "*go deep inside their own feeling*" and "*core values*", and "*establish a desired experience for the audience*".

(2)   What were the limitations when the students used the DSPI approach in their design processes?

Table 5.3: Three sub-clusters of "limitations".

Cluster of "limitations"	Quote number (see Appendix 2)	T o t a l (N=211)
Linear process	1, 31, 43, 143, 166, 168, 187, 208	8
Transition difficulties	12, 34, 35, 44, 47, 48, 57, 89, 91, 118, 120, 135, 173, 174, 176, 179, 180, 181, 188, 195, 209	21
Other factors	7, 11,14, 17, 20, 27, 36, 59, 63, 79, 90, 125, 140, 148, 160, 167, 190, 191, 195, 212, 213	21

There are three sub-clusters (linear process, transition difficulties, and other factors) identified (Table 5.3).

(a)   Linear process

DSPI seemed to be too straightforward to follow in the students' processes. In this cluster, 8 out of 211 quotes directly pointed this out. For instance, one of the students said DSPI as a linear process felt a little forced at first, and "*the linear process was opposed to actual working progress, which was not linear at all because we went into iterations*".

(b)   Transition difficulties

Another factor that seemed to be a limitation in the students' practices was the gap between each step of the DSPI approach. In this cluster, 21 out of 211 quotes were found. Seventeen quotes mentioned there was a gap between *Story* and *Production* (e.g., "*It was difficult to translate the Story and the Drama into an installation*

form that allowed people to experience your Drama."; "*I found that the big gap between Story and Production can quickly cause loss in the essence of the Drama.*"; "*In working with DSPI the translation from Drama-Story towards Production-Interaction turned out to be quite a step.*"; "*We spent a long time on the ideation, but when it came to Production, there was a huge gap between these.*"). This gap caused loss of intent and the desired experience on the audience perception. Some other quotes said the moment when the interactivity was involved, "*the focus shifted from the Drama to the feasibility of the technology*".

(c)   Other factors

Twenty-one quotes indicated some other factors that limited the students. The students stated that when they were asked to start from *Drama*, there was not enough attention paid to the actual audience experience. During the use of DSPI, for the students in general, *Drama* was the hardest component for them to understand and agree in group cooperation. Some quotes showed that the use of DSPI could not give guidelines for some practical difficulties, such as "*space setting*", "*production building*", and "*technological solutions*" in the design process.

5.4   Reflection

5.4.1 Intent and Intent Transformation

The DSPI approach played a positive role in guiding students through the design process, especially for those students who had no previous experience of creating interactive installations. *Drama* as the starting point forced the students to pay more attention to their intents, which were not what they were used to do before. The students with an industrial design background mentioned that they used to start with the user's perspective when they needed to design an interactive product. The students with a media art background that mentioned they always followed the detailed requirements and suggestions from the others, especially their teachers, before they started their digital artwork. Starting with *Drama* and sticking to *Drama* offered the possibility for the students to communicate the intent during the design process and gave a handle to rationalise the intent to be experienced and understood by the audience. For

instance, in *SOLOS*, as what the student described in the reflection: "*the Drama served as a source of inspiration to generate design ideas. Furthermore, it was the link between all the team members because we could communicate ideas to each other by using the Drama. Sometimes I lose track of what it is actually about in a design process. Having a Drama can help me to keep on track in my design processes. One aspect of the Story was to create a certain experience for the people who interacted with the art installation, to communicate a message. Defining a story with a plot also helps to make design decisions, just like the Drama does. During the design process, we experienced a gap between the story and the production phase like other groups did. We solved that by iterating between those phases and by adding and deleting elements of the story to make it coherent with our installation. We think the gap could be filled with the morale of the story, which often can be phrased in one sentence. Also, the installation should be able to 'communicate' the drama in one sentence, one interaction.*" (Dijk, 2015)

Besides, the intents of some installations were staged in the process of the experience. For example, to experience the installation *irespect* was an exploratory process of understanding the intent behind the installations. Some people from the audience seemed to lack patience and mood in going through this process.

5.4.2 Desired Experience and Actual Experience

The step of moving from *Drama* to *Story* helped the students figure out what a desired experience should be. In going from *Story* to *Production*, the students learned how to realize a desired experience in a specific context and a given environment. The students pointed out that there were certain difficulties in the process of "moving" from *Story* to *Production*. There was a gap between *storying* a desired experience in mind and setting up a concrete installation in real. They also gave several solutions. For example, they suggested adding iterations between *Story, Production* and *Interaction* where the iterations could help the transition from *Story* to *Production* in the process. The results of *Interaction* in these iterations could inform the students how to improve the quality of *Production* and design the experience as close as intended.

The installations in this workshop were built in a rather short period of time (few days). Some of them were not sufficiently stable. The instability of these installations also disrupted the smooth dynamics

of the actual experience (e.g., unstable distance sensors used in *irespect*). The instability also hindered the audience's understanding of the logic of action and reaction. As a result, the students often needed to explain the logic to the audience. However, this problem could be solved by stabilising the installations with improved software and hardware.

5.4.3 Installation-Audience Relationship

In this workshop, the students tried various installation-audience relationships with interactivity. Some installations (*The Dandelion*) focused on the tension between human beings and nature. For instance, the audience had to behave carefully otherwise the interactive experience would not happen or the audience had to behave in a certain way otherwise visual output would become an exaggerated deformation. Some installations (*irespect*) tried to let the audience be aware of the power and the rules of nature. For some audience members, they did not have a completed experience which limited their understandings of the intents behind these installations. Meanwhile, the installations (*Hui* and *SOLOS*) that offered immediate response became most popular. Other installations (*UNSEEN*) which perhaps needed take more time to get used to it or where the audience needed to spend some time on finding out how to interact caused the confusion. For the audience, some felt confused about where they should go and how they could interact.

5.4.4 DSPI in Workshop Nature

This workshop provided an overview of how DSPI was used in a series of coherent process by 39 students. *Drama* can be a strong anchor in the design process. This workshop also gave a new potential of using DSPI in practice. The iterations back and forward between *Story*, *Production* and *Interaction* can be a good way to solve the transition difficulties in the process of transforming the intent to the audience. By using the iterations, the practitioners are more likely to achieve the actual experience to be close to the desired experience (Figure 5.11).

In DSPI, *Drama* emerges from the practitioners' insights of the theme, metaphors, emotions and conflicts. Since I believe that it is important to start with *Drama* in the process of creating an

students

conflict
emotion
theme
metaphor

Drama

Story
iterating

Production

Interaction
iterating

audience

DSPI used as an approach in workshop Nature
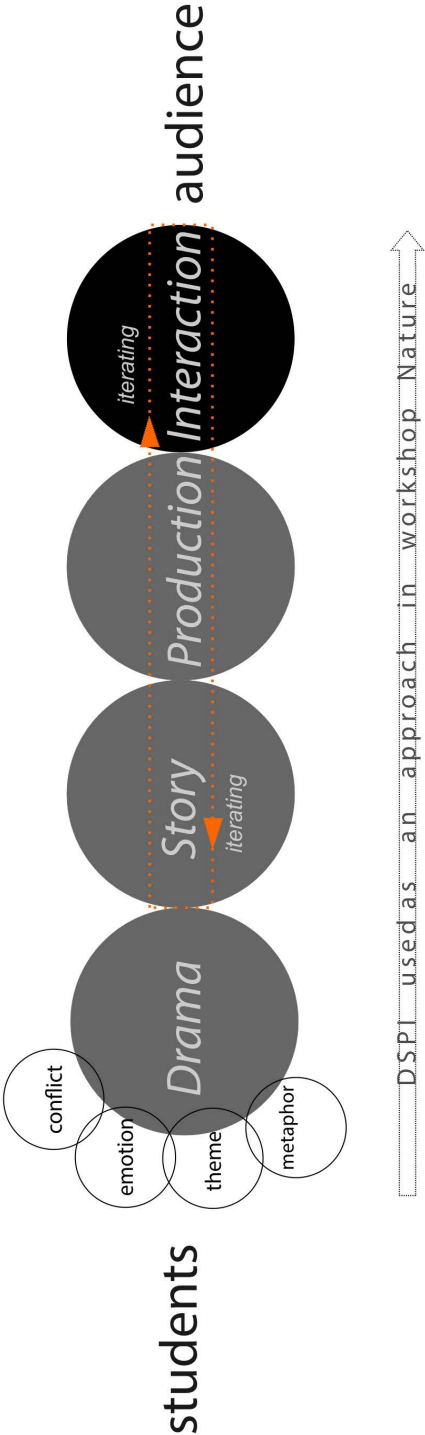
Figure 5.11: DSPI based on the results of the workshop Nature.

interactive installation, I am often asked the same question "which kind of *Drama* is a good *Drama*?" Knowing the difference between "good" *Drama* and "bad" *Drama* might be difficult. The depth of *Drama* relies on the accumulation of self-experiences, reservation of knowledge and personal values of the practitioners. Any *Drama* might go towards to a bad experience in an interactive artwork. It seems that the practitioners can better reflect on whether his/her *Drama* is well presented in the actual experience through DSPI.

Based on the voting results and the audience feedback, a well-designed interactive installation should be beautiful and well executed. The experience should be able to engage the audience and offer the variety of interpretations. Therefore, it seems that several aspects can be used to determine whether the actual audience experience could be more favourable for the audience. These aspects in an interactive installation may give indications whether the actual experience is what the practitioner intends to achieve.

As the next step, I aimed at applying DSPI to a long-term project with a number of iterations. An empirical evaluation was set up to address the actual experience through three aspects - aesthetics, engagement, and variety of interpretations.

Acknowledgements

REFLECTION ON CYCLE 2

This cycle explored the use of DSPI following a linear process from *Drama* to *Story*, from *Story* to *Production*, and from *Production* to *Interaction*. *Drama* emerges from the practitioner's insights into theme, metaphor, emotion, and conflict. Structuring *Drama* is a process to extract something significant from the intent. *Drama* in an interactive installation is not something concrete to be found by the audience. It is more a force that influences the awareness of the intent through *Interaction*. This awareness in the audience is the closest approximation of the intent that the practitioners can aim for. Relating to this, *Interaction* has two perspectives: audience and practitioners. First, *Interaction* is how the audience is experiencing an interactive installation, the process of the individual audience's encounter of an interactive installation. Second, the results of *Interaction* enable the practitioners to see and adapt to unforeseen consequences of their work. *Production* influences part of *Interaction* and through that the actual experience could be close to the desired experience.

The results of Cycle 2 suggest that the iterations between *Story* and *Interaction* may help the practitioners achieve the desired experience they intend to deliver. The results also indicate the future direction of this research. I would like to see the application of DSPI in a long-term project with increasing numbers of iterations. This project will be used to further explore the research questions. Meanwhile, in an empirical evaluation, three aspects - aesthetics, engagement, and variety of interpretations - will be used to address the actual

experience in this project.

notMONDRIAN (2017)

*4*5*3m*
interactive installation
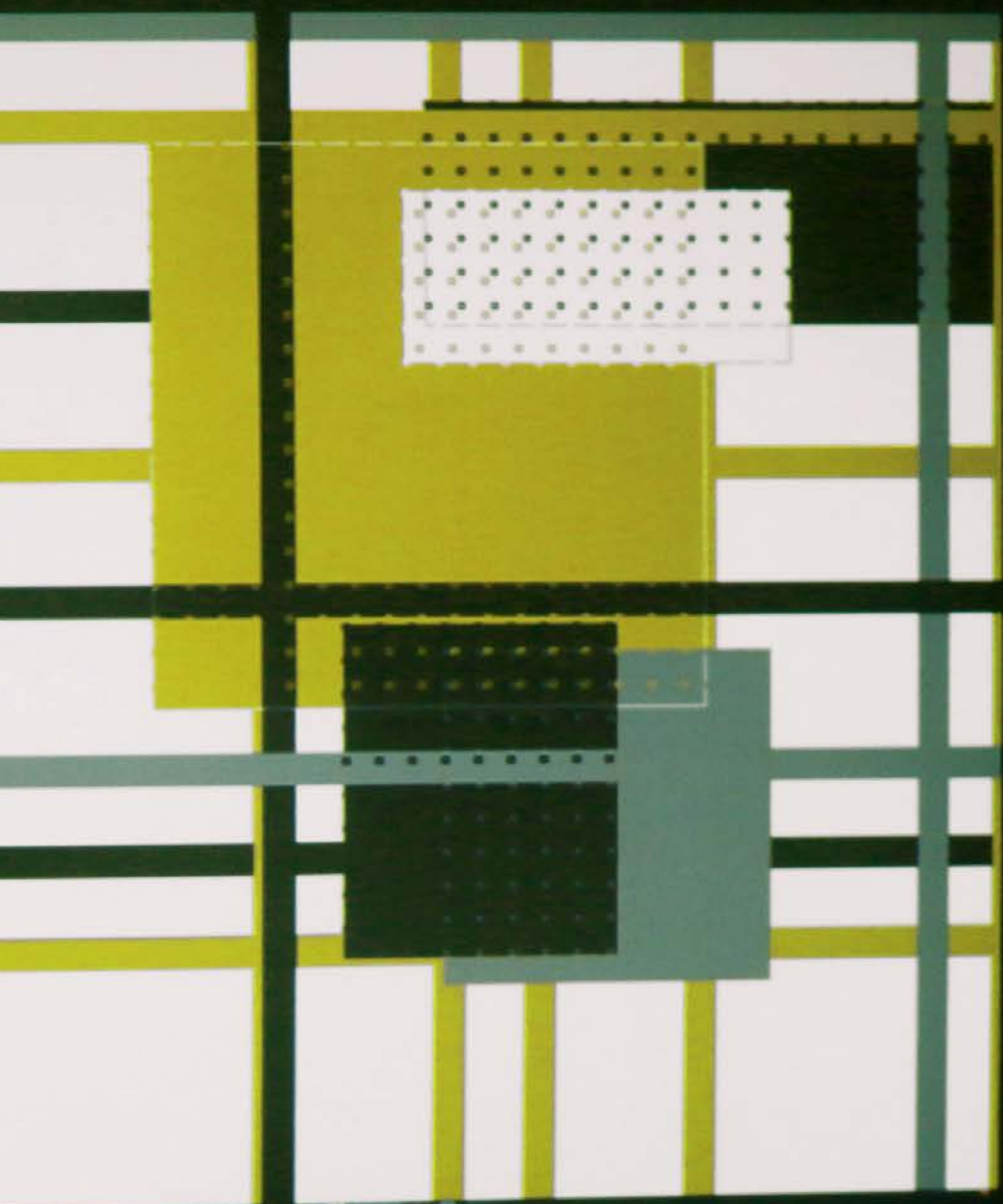
notMONDRIAN (2017)

*4*5*3m*
interactive installation

CYCLE 3

START FROM DRAMA
RETURN TO DRAMA

心湖 (2015) *by Chinese calligrapher Midi Zhang*
calligraphy for interactive installation HEART IS THE ONLY WAY
printed with permission

*120*50cm*
ink on rice paper

CHAPTER 6

HEART IS
THE ONLY WAY

"*Choosing when to stop altering an art piece can
be a highly individual decision.*"

- Ann Landi (2014)

6.1   About this Chapter

In this chapter, an interactive installation *HEART IS THE ONLY WAY* is introduced. The design process further explores the DSPI approach. This chapter describes the aim (section 6.2) and the process of conceptualization, iteration and implementation (section 6.3). The reflections of using DSPI in the design process are shown in section 6.4. A systematic evaluation of the actual experience is described in detail in the next chapter (chapter 7).

6.2   Aim

In 2003, when I was in Singapore, I was living on the east coast. Walking by the seashore at night was something I often did. In the darkness, the ocean was just like a giant black hole - mysterious and powerful. The waves rose and rushed down reflecting little lights. I could not bear hearing the roar of waves - the deep and long majestic sound. My situation at that moment was as dark as that piece of boundless ocean. Since I started to live in the Netherlands in 2012, these tough situations remind me of my days of standing by the seashore on the east coast in Singapore. My experience of what the heavy sadness could be became a catalyst. To turn the scene of the boundless sea in the night into an installation work had been on my mind for a long time. To create this work was to have an opportunity for me to face the fear, to stay with the energy that came from fear, and finally to liberate myself.

These life experiences had triggered me to start the project *HEART IS THE ONLY WAY* in 2015. In the following, the process of creating *HEART IS THE ONLY WAY* is described, together with the reflections of how DSPI was used in this process.

6.3   HEART IS THE ONLY WAY

The design process was guided by the DSPI approach. The use of DSPI was aiming at not only completing one interactive installation, also investigating how DSPI could help me express my feelings and life experiences with the audience. Moreover, I set out to discover how DSPI could help me go through three forms of negotiation in a longer term process and achieve the designed experience which could forward my intent to the audience.

6.3.1 Drama

The component *Drama* in *HEART IS THE ONLY WAY* incorporated one of the most intense life experiences from the last several years. The emotions related to these experiences were mixed with sadness, fear, and hope. Inspired by Hiroshi Sugimoto (1980)'s *Seascapes*, the seascape in its symbolic sense was used to express these mixed emotions. The seascape was understood as a unique, magical and mysterious place where "*living phenomena spontaneously can be generated from water and air in the presence of light, though that could just as easily suggest random coincidence as a Deity*" (Sugimoto, 1996). Four elements in the *Drama* were:

"Emotion: mixture of sadness, fear, and hope;

Metaphor: the seascape;

Theme: the journey of sensing self;

Conflict: inner emotional conflict."

6.3.2 Story

Introducing the performance of actions (Saltz, 1997) into the transition from *Drama* to *Story* enriched four elements of the above *Drama* and the identity of the *Story*. The journey of sensing self was transformed into the movements as a slow and rhythmic walking. Connecting Hiroshi Sugimoto's photography (Figure 6.1) to my life experience, the scene of one person walking by sea in the midnight was used to transit metaphor and emotion to the *Story*. One way chosen to reveal the inner emotional conflict in the *Story* was by briefly considering a range of answers of the question "what will a person do when she is walking by the sea in the midnight" and integrating the answers into the actions. I tried to perform the

Figure 6.1: A series of photographs of the sea in the night and in the darkness from *Seascapes* by artist Hiroshi Sugimoto. (photos from *http://www.sugimotohiroshi.com/seascape.html*, retrieved: 05-10-2016)

possible actions if I was walking by the sea in the midnight. To be honest, when I just started *HEART IS THE ONLY WAY*, I did not find out clear answers to this question. I only could see the component *Story* in a blurry shape. The *Story* was gradually formed later in the iterations of the design process.

I started with developing the *Story* which included an illusion of perception (Rozenbaum et al., 2003) and the suspense in the cognitive processing of the *Story* (Hoeken et al., 2000). The illusion would prevent the audience from perceiving the results too fast. *Storying* the desired experience in *HEART IS THE ONLY WAY* supported the suspense to be able to resolve and lead to a logical solution. Meanwhile, the illusion and the suspense might bring the trouble of sensing and offer the opportunities of sensing as well. Based on these two perspectives, I started to experiment Production with a blurry *Story*.

6.3.3 Production

Moving from *Drama* to *Production* with a still blurry *Story*, for the physical form, I needed to create a view of the dark and alive seascapes in an indoor space. For the interactivity, I did not have a clear answer to what it should be. Various versions of *Production* had been experimented with the view of "the boundless sea at midnight" inside a room to create a mysterious atmosphere. I hoped to complete the *Story* in the process of experimenting with the *Production*. In the following, I will describe the details of experimenting with the space, materials and interactive technologies in the back and forth process between *Story* and *Interaction*. During this iterative process, five experts[1] coming with a background in Industrial Design, Interaction Design, and Electrical Engineering were invited as the participants for their general comments and suggestions on the experiences of the prototypes. They were all from the Department of Industrial Design of TU/e.

(1) Space

To allow the audience to be immersed in a mysterious atmosphere was one of the spatial considerations of Production in *HEART IS THE ONLY WAY*. "*Interactive art always works with the spatiality of immaterial.*" (p.147, Lyotard, 1984) "*Atmospheres are thus always*

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1 Loe Feijs, Bart Hengeveld, Bin Yu, Linkai Tao and Xu Lin were the experts who involved throughout the iterative design process in this project and they gave their comments and suggestions for the working prototypes.

spatial." (p.119, Böhme, 1993) Atmospheres can also characterise spaces (Kwastek, 2013): consider the calm, white, empty room of Yayoi Kusama's installation *The Obliteration Room* (Kusama, 2012) and the mysterious atmosphere of the installation space in Olafur Eliasson's *The Weather Project* (Eliasson, 2003).
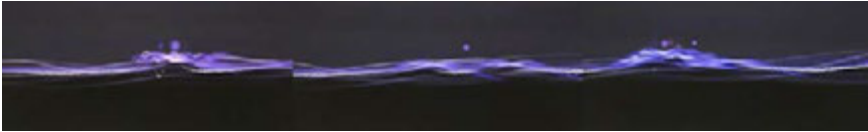
Figure 6.2: The visualization of "heart waves". This group of dynamic waves is stirred up by one participant's heart-beats in real time.

To achieve the mysterious atmosphere, I experimented with several different spatial layouts. I first used one projector to present the visualization of "heart waves" on a big white textile screen (4×1.2m). This set of dynamic waves was generated by the individual participant's heartbeats detected by a reflective photo plethys-mography (PPG) sensor in real time[2]. The visualization of waves on this white screen was clear; however, the atmosphere of mystery I wanted to express was hardly achieved (Figure 6.2).

I then built the installation in a space (5×6m) that enabled the audience to walk through. This space was structured by four screens made of metal, wood, muslin, and white curtains placed on different planes. The design of the space aimed at enhancing the atmospheres and strengthening the connections between the installation and the audience. Heart Waves were projected on the four screens, and the dynamics of waves were driven by one participant's heartbeats each time. The spectators could walk between different screens and feel the dynamic waves driven by heartbeats flowing around them. In this prototype, although the physical form of the prototype was moved from a flat screen into a more spatial one, the images were still the flat waves.

Figure 6.3: The tunnel prototype.

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2 Available at: *https://vimeo.com/107798800*, retrieved: 04-11-2016.

Later, a tunnel prototype[3] (15cm-diameter, 50cm-long) was created. The prototype offered in-depth visual images instead of the flat ones before. The bright and dynamic circles were driven by a participant's voice through a fixed laptop microphone and projected into the inner side of the tunnel. Voice-driven images were moved forward to the end of the tunnel and returned with floating color changes after hitting the other end (Figure 6.3). The tunnel as a spatial surface in this prototype created a strong visual effect. Moreover, the tunnel as a projection surface gave the visual output a sharp and tridimensional shape which was closer to my intent. One of the experts tried out and commented: "*Looking inside the tunnel, even it is just a prototype, moving images are already attractive, and I can look at these for a long time.*"

This tunnel prototype offered a clear guideline for the final presentation of *HEART IS THE ONLY WAY*. The atmosphere could depend on the depth of the space, and the images that appeared at the end of the tunnel were echoes of the images which started from the other end of the tunnel. The tunnel was continued as the main physical form in the final iteration.

(2)   Materials

"*For artists, material is of vital importance in expressing their thoughts, motives, and emotions.*" (p.199, Hu et al., 2014) Interactive art can be based on the materials in both physical and digital sense (Kwastek, 2013). The materials in the digital sense "*can be changed or controlled by external stimuli*" (p.200, Hu et al., 2014). Experiment with both the physical and digital materials for this installation was aimed at the representation of the boundless sea in the midnight (Figure 6.4). Different physical materials such as plastics, wood, metal, muslin, water, and threads were explored to understand their expressive senses. Experimenting with several natural and man-made materials, plastic foam board, aluminium foil, and wood, light-weight and semi-transparent muslin were used as a projection screen for the dynamic waves. An electric fan was placed behind the muslin screen to keep the muslin in motion. However, one of the experts commented that the muslin screen was too bright, and the fan was too noisy. This view was not the same as his expectation about the dark ocean. Therefore, I tried real water for presenting the view of the seascapes. Dynamic bright lines were projected on a bowl of water. The movements of lines were mapped according to

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3 Available at: *https://vimeo.com/115248743*, retrieved: 04-11-2016.

Figure 6.4: Upper: muslin screen as a projected surface. Bottom/left: plastic foam board as a projected surface. Bottom/middle: metal paper as a projected surface. Bottom/right: real water as a projected surface.

the participant's heartbeats detected by a PPG sensor; the surface transducer was hidden underneath the bowl with the heartbeats as input to create the ripples in the water. If only seeing the projected effect, the visual information transmitted via real water was very obvious. However, in the end, water was discarded for practical reasons. The used transducer did not have enough power to carry the weight of a bowl of water and to create the desired effects on the surface of the water. Later, the more powerful transducer was used in this prototype. The alternative transducer did work, however, it produced too much of loud noise that could damage the experience.

Later on, threads were used in the new prototype. On the one hand, threads were very easy to manage, and they could turn into many different shapes. On the other hand, thousands of threads added unpredictable details to the visual expressions. In the end, polypropylene threads were chosen as the main projection material for the final installation with the quality of being almost invisible in the darkness and becoming sparkling and delicate when being

Figure 6.5: The raw material used in the final presentation: Upper/left: polypropylene threads (each 7m-long, 0.4mm-diameter) formed as a big piece (3.14×7m). Upper/right and Bottom: The big piece of polypropylene threads was being a projected surface.

projected on (Figure 6.5).

(3)   Interactive technologies

In the design process, the development of the smart materials and the digital media in interactive installations give design opportunities and challenges to interactivity and participation (Hu et al., 2014b). Experimenting with interactive technologies was geared toward completing the *Story*: "what a person will do or should do next when she is walking by sea at midnight?" I started with the heart rate to build up the simplest mapping between personal biofeedback and the visual output. The reason for me to try the heart rate first was that biofeedback data could act as a "*bio-mirror*" of people's inner physiological functions and emotional responses in the interactive art (Khut, 2006; Yu et al., 2016). Heart rate data was calculated from the pulse signal in real time and used as the primary source to drive the process of the audience's experience. A reflective photo plethys-mography (PPG) sensor was used to measure a person's pulse. After

fitted with PPG sensor on their index finger, the participants could see the surface ripple with their heartbeats, where a higher heart rate was reflected by an active surface with faster and stronger vibrations. The heartbeats data was averaged over time. After experimenting, I found that the lack of immediate response caused some confusion. One of the experts commented that the images always remained the same. Sensor instability, such as data loss or noisy data, caused by hand or finger movement also disrupted the dynamic pattern. The PPG sensor might also limit the position and the posture of the participants in their experiences. One of the experts commented that she always had to hold the sensor.

When using heart rate had setbacks, I tried to go back to the *Drama*. I supposed that self-talk might be one of the ways leading us to the heart. The challenge was then how to motivate the participant to speak at the installation. I had two strategies for this. The first one was that the installation could be designed to be used by a single person. The second was that I recorded my own sighs, whispers, laughing, singing, and humming, and played them back as reactions to the individual's actions. I assumed if I wanted to let my audience speak out, I must speak out first.

The recorded voice was used to embed my own personal emotion and response to bring this installation to life. The recorded voice sent a message to the audience: "You can also speak out here." It was the reason why I tried the microphone as the impetus to begin the whole installation and unfold the experience for the audience.

Understanding the expressive features of space, materials and the interactive technologies helped me find the final solutions for *Production*: (1) spatial appearance of the physical form provided a strong reception to the audience; (2) threads as the main material in both physical sense and digital sense produced the view of "a boundless sea in the midnight"; and (3) the final choice of interactive technology completed the *Story* and this decision was made on the basis of the spatial appearance and the selected material.

(4)   Final Production

In this work, Production started with creating a tunnel to let people walk inside. Later, I had to change my *Story* and *Production* because the space for setting up the installation was 2.1 meters high, which was not enough to build a tunnel that people could walk through.

Figure 6.6: The final *HEART IS THE ONLY WAY* with projection.

At that moment, I had two options: either making a completely new physical form that was not a tunnel where people still could walk inside, or making a smaller tunnel where people could look inside instead of walk inside. I chose to keep the tunnel as a metaphor to represent the heart. This metaphor anchored in *Drama* which was the reason why the piece resulted in a rich outcome. Thousands of threads formed flowing sea waves. By speaking and moving in the space, people themselves transformed the installation into a piece of live dark sea.

This installation was designed and developed for public space. Due to its strong relation with the surrounding space and the need for potentially different exhibition locations, the installation had to be designed in a flexible way that it could be adapted to fit an exhibition space perfectly. The main object of the installation, the tunnel, was implemented with a ring sculpture. It was in essence a modular projection screen consisting of several rings connected by threads that together formed the screen-like surface. The tunnel itself could be extended to fit the exhibition space - both in length and in its depth. Several connected projectors used this ring sculpture as a shared projection surface, intentionally created dynamic patterns. The projected geometric shapes had to be coordinated to create the overall experience. Depending on the ring sculpture configuration, the connected projection setup could be extended to sufficiently cover the entire tunnel and create the desired density in dynamic patterns. In the following section, the connected projection setup and the sensing modalities integrated in the overall experience will be explained in more detail.

(a)   Physical form

The entire floor of the installation space (5×10×2.1m) was covered with white polypropylene foil. In this dark space, when the foil was illuminated, the effect it brought out could blur the audience's perception of the boundary of this environment. Under the projection light, the reaction of the fabrics also gave an impression that was associated with water. The whole physical form consisted of eight steel rings (1m-diameter) that were hung from the ceiling. The rings were spaced one meter from each other spanning over a total of seven meters. This ring structure was covered by thousands of white, highly reflective polypropylene threads (7m-long, 0.4mm-diameter) (Figure 6.6). A stage microphone stood in front of the ring structure. Four projectors were pointing up from the floor at

different angles. The projection area covered the entire surface of the ring sculpture.

(b) Interactivity[4]
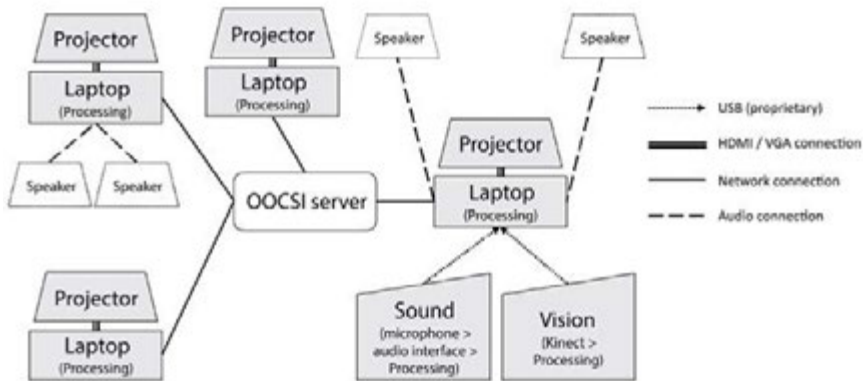
Figure 6.7: Schematic overview of an installation configuration with four projector-laptop pairs, an OOCSI server and two inputs for audience sensing (sound and vision; bottom right)

HEART IS THE ONLY WAY expressed the intent through spatial atmosphere, through expressive material, and through interactivity. The input coupled to the projection made the seascapes come alive. The pace of visual output dynamics was stable and slow aiming for a mystical visual effect. Meanwhile, the audience was given an opportunity to speak out. The pre-recorded voice motivated the audience to speak out during their individual experience. Consequently, the audience became a part of the happenings.

(i) Connected multi-angle projection

The connected multi-angle projection setup contained pairs of a projector and a laptop that were distributed throughout the installation space. Figure 6.7 shows a schematic overview of the installation setup omitting the technical nature of the networking connections (WIFI in this case). The laptops ran Processing software and they were linked to the respective projectors via HDMI or VGA. In addition to the visual projections, speakers were distributed in the space connected via audio cables to the laptops.

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4 Available at: *https://vimeo.com/180063538*, retrieved: 04-11-2016.

Processing is a programming environment based on the Java programming language and virtual machine, specialized for visual applications, and Processing sketches are programs that use built-in Processing functionality, which can be extended using libraries. In this installation, a single replicated Processing sketch was used for projection and one more sketch provided audience sensing capabilities.

(ii)   Networking and communication

The laptops were connected via a WIFI router to a central message bus which was shown in the center of Figure 6.7. A single server running the OOCSI platform[5] provided this shared message bus that all Processing sketches on the four laptops used. OOCSI connections were established through a dedicated Processing library[6] that also allowed for messaging, multiplexing, and higher-level protocols.

(iii)   Shared state

At the heart of the installation was a distributed state machine that allowed the installation to globally assume three different states and thereby changed the projections from all angles using the connected projectors. State changes were triggered by audience interaction. The four laptops ran the exact same Processing sketch, only its configuration differed. This design allowed the installation to scale horizontally with the number of employed projector-laptop pairs that were distributed in the installation space and connected through the OOCSI platform. These three states of the interactivity are as follows:

State 1: NOBODY PRESENT

In the dark space, four bright lines are flowing on the ring sculpture and the ceiling. The lines are slowly rotating. Four lines cross each other, leaving fuzzy reflections and fuzzy shadows, and they move through the ring sculpture, illuminating part of it. The bright lines help the sculpture create moving waves and small shining spots on the threads. These waves and spots are slowly moving on the polypropylene threads. It creates stunning water-like visual effects but keeps the overall environment dark and mysterious.

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5 OOCSI platform, *https://github.com/iddi/oocsi*, retrieved: 04-11-2016.
6 OOCSI for Processing, *https://github.com/iddi/oocsi-processing*, retrieved: 04-11-2016.

State 2: AUDIENCE ENTERING

When the individual participant from the audience enters the space and moves closer to the ring sculpture. A Kinect is used to detect the presence and the position of the audience, the state of AUDIENCE ENTERING then starts to run by four projectors together. The motion of the four bright lines starts to speed up. The balance is broken at this moment by the audience as he/she tries to walk closer.

State 3: AUDIENCE SPEAKING[7]

The participant can walk even closer to the ring sculpture, and he/she can arrive at the front of the sculpture where the stage microphone is. If the participant speaks out in front of the microphone, he/she can see the bright waves flow forward to the end of the ring sculpture (Figure 6.8), then backwards from the end with the reaction of the recorded female voice from me. The Kinect scans the microphone area and Processing is used for recording live audio input, generating the individual participant's voice according to sensor data. Four projectors work in an orderly manner, creating the moving waves forward and backwards according to the discretion and speed of the participant's voice.

(iv)   Distributed control

Although even very small computers such as Raspberry Pi boards or similar would have been sufficient, the use of laptops allowed me to have a better control over the installation experience: I could use every connected laptop to send state change events and so trigger a different global state in the entire installation. This proved to be crucial for setting up and fine-tuning this large-scale installation as the installation could be controlled easily from different viewing angles without the need to move back to a central point of control.

(v)   Audience sensing

For large-scale interactive installations, sensing the audience, and reacting to it, is a key element, and often the whole purpose of the design. There are many ways to sense human activity in the context of an installation such as sounds, proximity, touch, vision and others. However, installations in the public space are often freely accessible and do not constrain or guide the audience in their movements.

7 Available at: *https://vimeo.com/150769115*, retrieved: 04-11-2016.

Figure 6.8: *HEART IS THE ONLY WAY* in State 3.
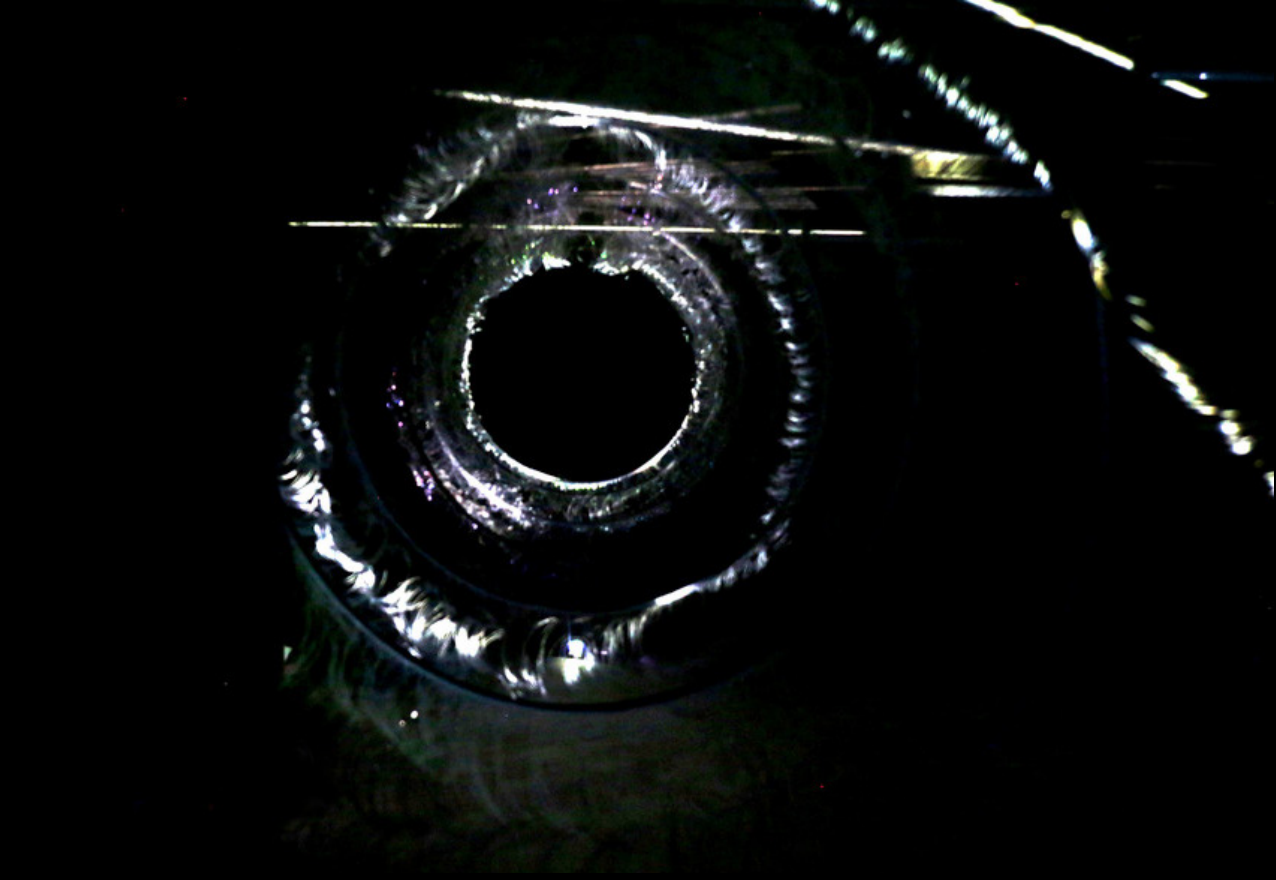
This poses challenges to the designer of the interaction, for which different solution strategies can be devised. The installation worked with different types of sensing to detect presence or audible utterances of the audience. While presence determined the different states of the installation (through internally triggered state changes), the sound sensing was activated in a single state and used to engage a single audience in a challenge-response. At the bottom of Figure 6.7, two inputs are shown, sound and vision, which will be explained in the following.

(vi)   Presence sensing

The Kinect is a low-resolution depth sensor that allows live tracking of spatial scenes and, through computer vision, also human shapes and skeletons. This feature was used in the installation to determine the presence and approximate location of the audience in the installation space. Depending on their position, the global state of the installation was changed and different experiences were provided to the audience.

(vii)   Sound sensing

The state AUDIENCE SPEAKING realized an auditory response mechanism that tracked utterances from the audience located close to a microphone, and let the installation answer them with pre-recorded voice samples after a few hundred milliseconds. The sound response was played from speakers underneath the ring sculpture and distributed throughout the space, which was accompanied by matching light projections that were synchronized across all projectors. The sound input processing and sound output was available from all Processing applications, which allowed for flexible placement of installation elements in a larger exhibition setting without the need for re-programming. In addition, multiple microphones at different vantage pointed towards the installation, and sound responses coming from different spatial locations (with their distinctive acoustic properties) could be easily realized.

The technical architecture and design of the installation achieved a robust installation that delivered a consistent experience that was necessary for extensive evaluation over weeks. This was achieved through strict modularity, managing a shared communication process and finally a visual and sound design that mirrored the

distributed system well.

6.4   DSPI in HEART IS THE ONLY WAY

The whole design process of *HEART IS THE ONLY WAY* took almost one and a half years. It explored the possibility of using DSPI as an approach in this long-term design process - starting with *Drama* and sticking to *Drama*; narrating a vague *Story* and completing this *Story* through the explorations of *Production*; setting *Production* based on the *Interaction* as a reference. In this long and sometimes painful process, the use of DSPI indeed started from the *Drama* and eventually returned to *Drama*. The component *Drama* did help me stay with my original intent. Meanwhile, *Drama* helped me to make the decisions in the design process. The most difficult problem was for me to transition the *Drama* to the *Story* in the design process. The *Drama* was bred from the first person perspective - my life experience in the memory. The transition from *Drama* to *Story* involved the existence of the third person perspective, especially when the aim of transition was to achieve empathy. The method to create this transition was by considering the life performance of actions based on the four elements in the *Drama*.

The DSPI approach was also used as an iterative process. These iterations played a part in achieving the goal of offering the experience as intended. The preceding iterations anchored in the *Drama* and tried to complete the component *Story* by trying out the different possibilities of *Production*. Through trying out different spatial possibilities, different expressive materials and different interactive technologies in the iterative process, the final installation highlighted the role of *Production* in the actual audience experience. Going beyond creating a "beautiful" appearance, the development of *Production* explored the artistic expression of the seascapes step by step. Moreover, I invited experts to experience the earlier prototypes in this iterative process. I gained the insights which helped me to complete and adapt the *Story* to the "right" *Production*. The iterative process helped to bring the desired experience closer to the actual outcome.

In the next chapter, an empirical evaluation of experience in *HEART IS THE ONLY WAY* will be presented. This evaluation will assess the actual experience through three aspects: aesthetics, engagement, and variety of interpretations. The factor of aesthetics is aimed at evaluating the goodness and beauty of the installation. Engagement

is related to the determination of the audience engagement in the installation. Variety of interpretations offers an understanding of how the audience perceives the meaning of the installation.

Acknowledgements

HEART IS THE ONLY WAY (2015)

*5*10*2.1m*
interactive installation

CHAPTER 7

EXPERIENCE
IN
HEART IS
THE ONLY WAY

"There is a 'huge gap' between my design process, which took over a year, and the 10 minutes that it took for each audience member to experience it."

- Yu Zhang (2016)

7.1   About this Chapter

In this chapter, an empirical evaluation is presented in which three aspects were measured to access the actual experience - aesthetics, engagement, and variety of interpretations. The details of this evaluation are introduced in section 7.2 and 7.3. Based on the design process (chapter 6) and the evaluation results and discussion (section 7.4-7.5), section 7.6 offers a reflection on how DSPI helped to deal with tension of the practitioner-audience negotiation.

7.2   Evaluation

The evaluation had two conditions: Condition 1 (the installation without interactivity) aimed at offering a baseline for comparison and discussion. Condition 2 (the installation with interactivity) aimed at evaluating the influence of the interactivity on the experience. These two conditions were tested with two independent groups in room U54 of Pavilioen building in TU/e during February 15th - 29th, 2016.

7.2.1 Pilot Study

The evaluation was preceded by a pilot study with six participants divided into two independent groups: with and without interactivity. I will not elaborate on the pilot experiment, except for the lessons it taught me. In the pilot experiment, the participants were given too many clues on how to operate the installation because the experimenter stayed together with the participants in the same space for observation and the experimenter answered the questions from the participants during the experiment. For instance, "*Can I walk around? Can I lie down?*" - one of the participants continued asking in his experiment; "*How can I interact with this installation?*" - another participant asked just after entering the installation space. The lesson was that all participants spent less of their energy finding out how the installation worked which was opposite to the design purpose of the experience: the participants' effort to figure out the installation would govern most of their personal experiences. Moreover, the experimenter's presence influenced the behaviour of the participants. One of the participants commented after his experiment: "*Because someone is here, I feel I am not comfortable to say anything I want.*" Therefore, in the later experiment, the experimenter stayed out of the installation space.

7.2.2 Participants

A total of thirty-nine people were asked to participated in this experiment. All participants were students or employees of TU/e. The advantage of having participants from the same social group (TU/e) was "*that the factors other than values were more constant than they would be in a heterogeneous participant group*" (p.66, Koskinen et al., 2011). The participants were randomly categorised into two independent groups as follows 20 participants in condition 1 including 14 males and 6 females and 19 participants in condition 2 including 7 males and 12 females. The participant ages ranged from 20 to 63 years old. These participants were not paid for taking part in the experiment.

7.2.3 Setup

The evaluation took place in the space where the installation was built up (Figure 7.1). One laptop was used by the experimenter to switch into one of these two conditions before each participant started without the intervention from the experimenter. Four projector-laptop pairs were used to present the two conditions in the installation space. In condition 1, the three states of interactivity were played back as a loop without interactivity. Condition 1 offered only a pre-scripted experience of a total of 90 seconds. The experience included 5 seconds of NOBODY PRESENT, 10 seconds of AUDIENCE ENTERING, 25 seconds of AUDIENCE SPEAKING, 10 seconds of AUDIENCE ENTERING, and 40 seconds of AUDIENCE SPEAKING. The pre-scripted experience was designed to follow the average time of the participants in the condition of with interactivity in the pilot study. With no interactivity, the recorded female voice as audio reactions appeared in AUDIENCE SPEAKING was played back randomly. Condition 2 included the interactivity in its experiment (see section 6.3.4 in the previous chapter).

Figure 7.1: a-b: The room U54 in Pavilioen before installation set-up. c-d: The room U54 in Pavilioen after installation set-up.

7.2.4 Procedure

Informed by the pilot study, the experiment procedure for the individual participant was as follows:

Step1: The participant was welcomed at the entrance of the room U54 which was equipped with a small table, two chairs, and a pen for the participant to read the instructions and fill out a consent form and a personality questionnaire.

Step2: Directly after the instruction step, the participant entered the installation space and tried out the individual experience in the installation. The experimenter stayed out of the installation space and used the laptop to start the experimental condition remotely. The participant got time to explore the installation. During the experiment, if the participant was staying in the installation space more than ten minutes, the experimenter would stop the experiment.

Step3: The participant went back to the entrance and filled out the evaluation form about their experience with pen on paper.

7.2.5 Measures

"*Despite the fact that interactive art is a form that privileges experience over static objects, there is very little empirical research on the actual audience experience of this art form. Some of the most significant work in this area has come from research projects where the fields of interactive art and human-computer interaction intersect* (p.49, Costello et al., 2005)." By using the co-discovery method, Höök et al. (2003), for example, have recorded the conversations between researchers and participants in a laboratory setting. The verbal data help to describe, understand and analyse the audience experience of interactive installations. Lehn et al. (2001) present a visual analysis of how the audience encounters interactive exhibits in real-world situations through video-based observations. Robertson et al. (p.1, 2006) have used critical computing approaches to gather the audience behaviours in museums and galleries. The results have been used to develop "*the potential interaction and experiential opportunities within a multi-user, immersive, interactive environment*". Costello et al. (p.1, 2005) "*bridge the gap between the observational research in real-world settings and more in-depth verbal data-gathering in laboratory conditions exemplified by Höök et al. They gather and analyse verbal data from real-world audience encounters to gain the*

insight into the situated experience of interactive art." The research mentioned comes in many different shapes and sizes whereas the practice of each is situated in its circumstances. However, there is a lack of research that uses both questionnaires as quantitative data collection methods and for in-depth interviews as qualitative data to assess the experience in an interactive installation. In this evaluation, quantitative and qualitative data together aimed to provide accurate measures to assess the personal experiences. The quantitative data was gathered from the AttracDiff2 questionnaire (Hassenzahl, 2004, 2003; Hassenzahl et al., 2015). and the User Engagement Scale (O'Brien et al., 2010). The qualitative data was gathered from five open-ended questions (Appendix 3) which were formulated based on Höök et al. (2003)'s work.

(1)   The AttracDiff2 questionnaire

The first part of the evaluation form was the AttracDiff2 questionnaire. It consisted of 28 questions on a seven-point Likert scale. These 28 questions were grouped into three categories - pragmatic attributes (PQ), hedonic attributes (HQ) subdivided into identification (HQI) and stimulation (HQS), and attractiveness attributes (ATT) (Hassenzahl, 2004, 2003; Hassenzahl et al., 2015). The AttracDiff2 questionnaire was used in its original form and was intended to assess aesthetics of the actual experience (Appendix 3, No. 1- No. 28).

(2)   The User Engagement Scale

The second part was the User Engagement Scale which consisted of 31 questions on a five-point Likert scale. It was used to assess users' perceptions of perceived usability (PUs), aesthetics (AE), novelty (NO), felt involvement (FI), focused attention (FA), and endurability (EN) aspects of the experience (O'Brien et al., 2010; O'Brien et al., 2013). The User Engagement Scale was adapted by exchanging the sentences "*I was shopping on this website*" with "*I was experiencing this installation*", "*this shopping website*" with "*the installation experience*", "*this shopping experience*" with "*this installation experience*" and "*this shopping task*" with "*this installation experience*". The User Engagement Scale used in this evaluation was intended to measure engagement of the actual experience (Appendix 3, No. 29- No. 59).

(3)   Open-ended questions

Five open-ended questions were formulated as the third part of the evaluation form to assess the "variety of interpretations" in this evaluation. Based on a set of open-ended questions which were used in evaluating an interactive installation The Influencing Machine (Höök et al., 2003), five opened-ended questions in this experiment were formulated as follows (Appendix 3, No. 60- No. 64):

"Which kind of emotions did this installation raise with you? Could you please explain?";

"Did you experience that you could influence the installation in any way? Could you please explain?";

"What did you think of the sound (e.g., background sound/ reacting female voice)? Could you please explain?";

"What did you think of the projected images? Could you please explain?";

"What is the meaning of this installation according to your views? Could you please explain?"

7.3   Hypotheses

The evaluation was set up to investigate the actual experience and to compare with three aspects aesthetics, engagement, and variety of interpretations between condition 1 and 2. They were sharpened into the hypotheses as follows:

7.3.1 Aesthetics

1a: Condition 1 offers the better aesthetic experience than a set threshold.

This is operationalized as the differences in perceiving the aesthetic experience in condition 1 and the threshold by using the AttracDiff2 questionnaire's measures. This means that condition 1 is expected score better on pragmatic quality (PQ), hedonic quality-identification (HQI), hedonic quality-stimulation (HQS), and attractive quality (ATT) than the threshold.

1b: The differentiating factors in the AttracDiff2 questionnaire provide the evidence that the participant's experience in condition 2 is more aesthetic than in condition 1.

To investigate if the participant's experience in condition 2 is more aesthetic, the measures of pragmatic quality (PQ), hedonic quality-identification (HQI), hedonic quality-stimulation (HQS), and attractive quality (ATT) in condition 2 will be compared to the same measures in condition 1.

7.3.2 Engagement

2a: The participants are more engaged in condition 1 than a set threshold.

This is operationalized as the difference in perceiving the participant's engagement in condition 1 and the threshold by using the User Engagement Scale's measures. This means that condition 1 is expected to score better on perceived usability (PUs), aesthetics (AE), endurability (EN), novelty (NO), felt involvement (FI), and focused attention (FA) than the threshold.

2b: The differentiating factors in the User Engagement Scale provide the evidence that the participants are more engaged in condition 2 than in condition 1.

To find out if the participants are more engaged in condition 2, the measures of perceived usability (PUs), aesthetics (AE), endurability (EN), novelty (NO), felt involvement (FI), and focused attention (FA) in condition 2 will be compared to the same measures in condition 1.

7.3.3 Variety of interpretations

3a: Visual-auditory output in condition 2 brings the actual experience close to what the practitioner intended.

HEART IS THE ONLY WAY was designed as an immersive visual-auditory installation. This means that the difference between the responses on visual-auditory output in condition 1 and in condition 2 will be evident. The visual-auditory output in condition 2 can characterize the audience interpretations of its resulting experience.

3b: Emotional responses in condition 2 bring the actual experience close to what the practitioner intended.

Creating an emotional resonance was one of the purposes of achieving the actual experience as intended. This means that the difference between the responses on affective emotions in condition 1 and in condition 2 will be significant. The responses on affective emotions in condition 2 will be closer to what the practitioner intended.

3c: Overall interpretations are various in condition 2 bring the actual experience close to what the practitioner intended.

The practitioner designed the experience with the purpose that the participant could understand the intent of the practitioner during the experience. This means that the difference between the responses on interpreting condition 1 and condition 2 will be evident. The responses on interpreting condition 2 will be closer to what the practitioner intended.

7.4 Results

For the AttracDiff2 questionnaire, pragmatic quality (PQ), hedonic quality-identification (HQI), hedonic quality-stimulation (HQS), and attractive quality (ATT) are calculated per participant by averaging the scores of the seven scales for each of the 39 participants. Cronbach's Alpha is calculated on the pooled results to check the internal consistency for all participants: pragmatic quality (PQ), α = 0.805; hedonic quality-identification (HQI), α = 0.738; hedonic quality-stimulation (HQS), α = 0.737; attractive quality (ATT), α = 0.721. These values are in the same ranges compared to the ones Hassenzahl found in 2004.

For the User Engagement Scale, perceived usability (PUs), aesthetics (AE), endurability (EN), novelty (NO), felt involvement (FI), and focused attention (FA) are calculated per participant by averaging the scores of the five scales for each of the 39 participants. Cronbach's Alpha is calculated on the pooled results to check the internal consistency for all participants: perceived usability (PUs), α = 0.814; aesthetics (AE), α = 0.747; endurability (EN), α = 0.745; novelty (NO), α = 0.724; felt involvement (FI), α = 0.733; and focused attention (FA), α = 0.730. These values are in the same ranges compared to the ones O'Brien found in 2010.

Table 7.1: T-test with PQ (pragmatic quality), HQI (hedonic quality-identification), HQS (hedonic quality-stimulation), and ATT (attractive quality) in condition 1.

	N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
PQ	20	-.350	.630	.141	-2.483	19	.023	-.350	-.645	-.055
HQI	20	.744	.483	.108	6.883	19	**.001**	**.744**	.518	.970
HQS	20	1.164	.657	.147	7.917	19	**.001**	**1.164**	.856	1.472
ATT	20	1.278	.622	.139	9.192	19	**.001**	**1.278**	.987	1.569

Table 7.2: ANOVA with PQ (pragmatic quality), HQI (hedonic quality-identification), HQS (hedonic quality-stimulation), and ATT (attractive quality) in two independent groups.

		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Non-cent. Parameter	Observed Power[a]
PQ	Intercept	6.031	1	6.031	1.434	.239	.037	1.434	.215
	group	11.057	1	11.057	2.629	.113	.066	2.629	.352
	Error	155.624	37	4.206					
HQI	Intercept	252.299	1	252.299	120.812	.000	.766	120.812	1.000
	group	13.060	1	13.060	6.254	**.017**	.145	6.254	.683
	Error	77.269	37	2.088					
HQS	Intercept	447.961	1	447.961	144.718	.000	.796	144.718	1.000
	group	3.741	1	3.741	1.209	.279	.032	1.209	.188
	Error	114.530	37	3.095					
ATT	Intercept	690.076	1	690.076	267.938	.000	.879	267.938	1.000
	group	26.531	1	26.531	10.301	**.003**	.218	10.301	.878
	Error	95.294	37	2.576					
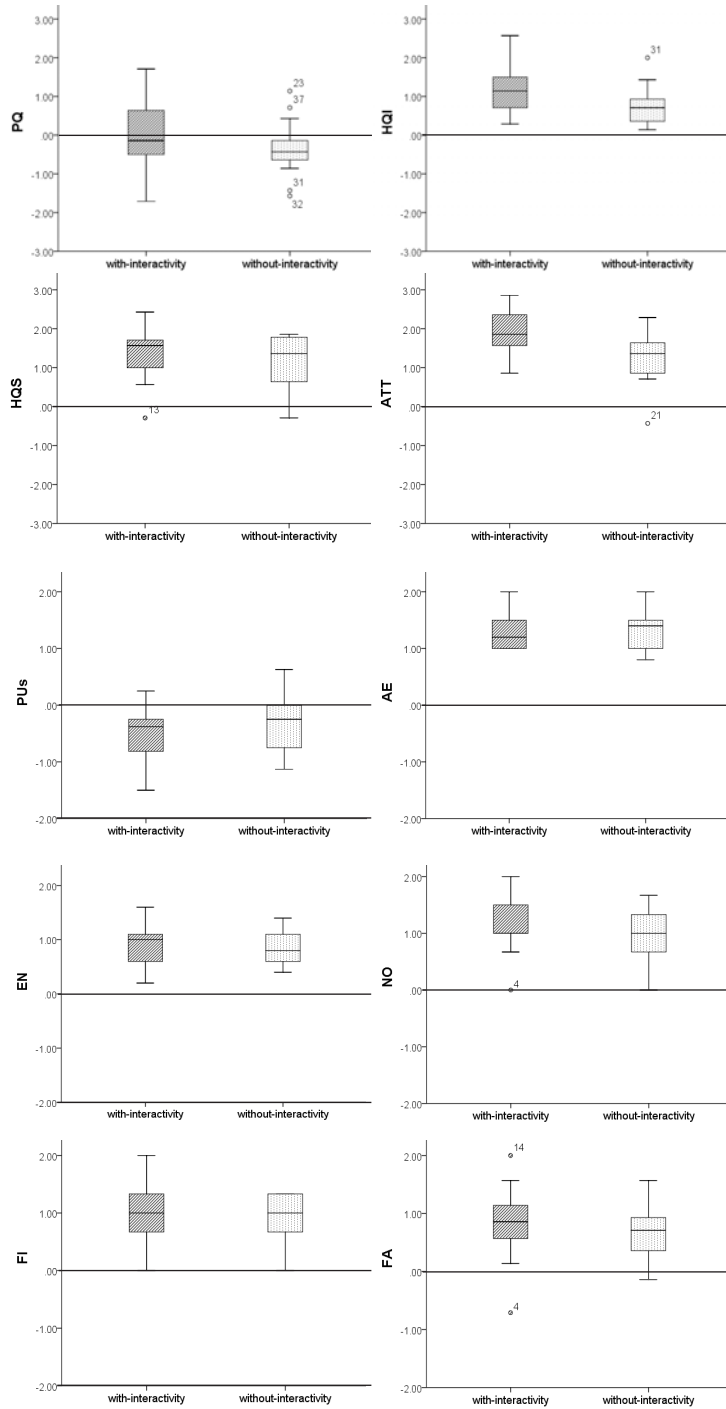
Figure 7.2: Boxplots of PQ (pragmatic quality), HQI (hedonic quality-identification), HQS (hedonic quality-stimulation), and ATT (attractive quality) in two conditions - condition1 (without interactivity) and condition 2 (with interactivity).

Figure 7.3: Boxplots of PUs (perceived usability), AE (aesthetics), EN (endurability), NO (novelty), FI (felt involvement), and FA (focused attention) in two conditions - condition1 (without interactivity) and condition 2 (with interactivity).

7.4.1 Aesthetics

Tables 7.1, 7.2 and Figure 7.2 are generated from the AttracDiff2 questionnaire - the values of the four measurements - pragmatic quality (PQ), hedonic quality-identification (HQI), hedonic quality-stimulation (HQS), and attractive quality (ATT) in two different conditions. I re-coded this seven-point Likert scale for the purpose of testing the threshold which was zero (Morrison, 1982), so 1 became -3, 2=-2, 3=-1, 4=0, 5=1, 6=2, and 7=3.

1a: Condition 1 offers a more aesthetic experience than a set threshold.

From the aspects of hedonic quality-identification (HQI), hedonic quality-stimulation (HQS), and attractive quality (ATT), except pragmatic quality (PQ), the mean in condition 1 is significantly different from the comparison threshold (zero) which suggests condition 1 provides a positive aesthetic experience (Table 7.1).

1b: The differentiating factors in the AttracDiff2 questionnaire provide the evidence that the participant's experience in condition 2 is more aesthetic than in condition 1.

Here I find a significant difference between two conditions both for hedonic quality-identification (HQI) $(F(1,37) = 6.254, p = 0.017)$ and attractive quality (ATT) $(F(1,37) = 10.301, p = 0.003)$, and no significant differences for pragmatic quality (PQ) and hedonic quality-stimulation (HQS). With regards to the mean scores of hedonic quality-identification (HQI), and attractive quality (ATT), condition 2 is significantly above condition 1. For the mean scores of hedonic quality-identification (HQI), hedonic quality-stimulation (HQS), and attractive quality (ATT), both conditions are located in the higher region than zero. The mean value of PQ in condition 2 is located in the region which is close to the average of zero (Table 7.2, Figure 7.2).

7.4.2 Engagement

Tables 7.3, 7.4 and Figure 7.3 are generated from the User Engagement Scale - the values of six measurements - perceived usability (PUs), aesthetics (AE), endurability (EN), novelty (NO), felt involvement (FI), and focused attention (FA) in two conditions. I re-coded this five-point Likert scale for the purpose of the threshold was to be tested which was zero (Morrison, 1982), so 1 became -2, 2=-1, 3=0,

Table 7.3: T-test with PUs (perceived usability), AE (aesthetics), EN (endurability), NO (novelty), FI (felt involvement), and FA (focused attention) in condition 1.

| | N | Mean | Std. Deviation | Std. Error Meant | The threshold = 0 | | | | | |
| | | | | | t | df | Sig. (2-tailed) | Mean Difference | 95% Confidence Interval of the Difference | |
									Lower	Upper
PUs	20	-.314	.545	.122	-2.571	19	.019	-.314	-.569	-.058
AE	20	1.310	.346	.077	16.919	19	**.001**	1.310	1.148	1.472
EN	20	.830	.313	.070	11.857	19	**.001**	.830	.684	.977
NO	20	.967	.430	.096	10.049	19	**.001**	.967	.765	1.168
FI	20	.900	.473	.105	8.526	19	**.001**	.899	.678	1.120
FA	20	.665	.437	.098	6.807	19	**.001**	.665	.461	.870

4=1, and 5=2.

2a: The participants are more engaged in condition 1 than a set threshold.

From the aspects of aesthetics (AE), endurability (EN), novelty (NO), felt involvement (FI), and focused attention (FA), except perceived usability (PUs), the mean in condition 1 is significantly higher than a set threshold (zero) which suggests that condition 1 provides the positive engaging experience when assessing these five measurements (Table 7.3).

2b: The differentiating factors in the User Engagement Scale provide the evidence that the participants are more engaged in condition 2 than in condition 1.

There is no significance in all six measurements. With regards to the mean scores of aesthetics (AE), endurability (EN), novelty (NO), felt involvement (FI), and focused attention (FA), both conditions are located in the higher region than zero (Table 7.4, Figure 7.3).

Table 7.4: ANOVA with PUs (perceived usability), AE (aesthetics), EN (endurability), NO (novelty), FI (felt involvement), and FA (focused attention) in two independent groups.

		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
PUs	Intercept	56.580	1	56.580	26.878	.000	.421	26.878	.999
	group	4.016	1	4.016	1.908	.176	.049	1.908	.270
	Error	77.888	37	2.105					
AE	Intercept	338.598	1	338.598	572.734	.000	.939	572.734	1.000
	group	.013	1	.013	.022	.883	.001	.022	.052
	Error	21.874	37	.591					
EN	Intercept	143.159	1	143.159	226.011	.000	.859	226.011	1.000
	group	.143	1	.143	.226	.637	.006	.226	.075
	Error	23.436	37	.633					
NO	Intercept	140.801	1	140.801	217.354	.000	.855	217.354	1.000
	group	1.997	1	1.997	3.083	.087	.077	3.083	.402
	Error	23.968	37	.648					
FI	Intercept	117.539	1	117.539	166.615	.000	.818	166.615	1.000
	group	1.232	1	1.232	1.746	.195	.045	1.746	.251
	Error	26.102	37	.705					
FA	Intercept	147.143	1	147.143	80.576	.000	.685	80.576	1.000
	group	1.341	1	1.341	.734	.397	.019	.734	.133
	Error	67.567	37	1.826					

7.4.3 Variety of Interpretations[1]

3a: Visual-auditory output in condition 2 brings the actual experience close to what the practitioner intended.

Two open-ended questions are related to the visual-auditory output for audience sensing in the actual experience. One open-ended question is related to the auditory output: "What did you think of the sound (e.g., background sound/ reacting female voice)? Could you please explain?" (Table 7.5)

1 See Appendix 4.

Table 7.5: Comments about auditory output in two conditions - condition1 (without interactivity) and condition 2 (with interactivity).

Comments about auditory output	Condition 1 (without interactivity) (N=20)	Condition 2 (with interactivity) (N=19)
feel lost		1
feel involved	1	5
feel calm	5	4
feel curious	2	1
feel everything is alive		1
feel constricted	1	
feel conflict or confusion	8	1
feel sadness	2	
feel scared	2	3
feel it is abstract	1	
feel a sense of mystery	2	
recalling memories	2	3

The participants described the sound through expressions such as: "*feel lost*" (1 of 19 in condition 2); "*involved*" (5 of 19 in condition 2 and1 of 20 in condition 1); "*made me calm down*" (4 of 19 in condition 2 and 5 of 20 in condition 1); "*made me curious*" (1 of 19 in condition 2 and1 of 20 in condition 1); "*made everything seem alive*" (1 of 19 in condition 2); "*recalled memories*" (3 of 19 in condition 2 and 2 of 20 in condition 1); "*strict*" (1 of 20 in condition 1); "*conflict, confusing*" (1 of 19 in condition 2 and 8 of 20 in condition 1); "*sad*"(2 of 20 in condition 1); "*scared*" (3 of 19 in condition 2 and 2 of 20 in condition 1); "*abstract*" (1 of 20 in condition 1); "*mysterious*" (2 of 20 in condition 1). The feedback shows that for the interactivity in sound, the participants seemed more positive, less confused. Only one participant in condition 2 said he was confused but "*confused in a good way*".

One open-ended question is related to the visual output: "What did you think of the projected images (e.g., the form/ the visual effects)? Could you please explain?" (Table 7.6)

The participants described the visual effect in the art installation through the expressions such as: "*nice*" or "*beautiful*" (9 of 19 in condition 2 and 10 of 20 in condition 1); "*amazing*" (1 of 19 in condition 2); "*dramatic*" (1 of 19 in condition 2); "*feel peaceful*" (2 of 19 in condition 2 and 2 of 20 in condition 1); "*presentable*"(2 of 19 in condition 2); "*reminds of sea/water/lake*" (1 of 19 in condition 2 and

Table 7.6: Comments about visual output in two conditions - condition1 (without interactivity) and condition 2 (with interactivity).

Comments about visual output	Condition 1 (without interactivity) (N=20)	Condition 2 (with interactivity) (N=19)
feel nice or beautiful	10	9
feel amazing		1
feel dramatic		1
feel peace	2	2
feel presentable	2	1
reminded of sea or water or lake	1	1
reminded of universe	1	2
reminded of memories	1	2
no logic	3	

1 of 20 in condition 1) ; "*reminds of universe*"(2 of 19 in condition 2); "*reminds of memories*" (2 of 19 in condition 2 and 1 of 20 in condition 1); "*no logic*" (3 of 20 in condition 1). Almost all of the participants in both conditions were very positive about the visual effect in the art installation. Both groups of participants expressed that they liked how the images moved and they enjoyed the effect when they were standing in front of the tunnel and looking into the tunnel. Three of the participants from condition 1 mentioned they realised the images were in the simple loop and they could not find the logic of the changes (3 of 20 in condition 1).

3b: Emotional responses in condition 2 bring the actual experience close to what the practitioner intended.

One open-ended question is related to emotional responses: "Which kind of emotions did this installation raise with you? Could you please explain?" (Table 7.7)

In condition 2, 16 of 19 participants described their emotions within the art installation as a process. These 14 participants all started with "*curiosity*". Eight of these 14 people ended with the experiences such as being involving into the experience and forgetting the environment, and another 6 of these 14 people ended with the experiences such as being excited/pleasure/interested/attracted. In the middle of the process, most of these 14 participants had positive experiences - being "*attracted*" or "*peaceful*" and feeling "*pleasant*" or "*good*". Besides, two participants in condition 2 described their emotions started with being scared then slowed down and finally

Table 7.7: Comments about emotion in two conditions - condition1 (without interactivity) and condition 2 (with interactivity).

Comments about emotion		Condition1(without interactivity) (N=20)	Condition 2 (with interactivity) (N=19)
hard to describe		4	3
feel isolated, lonely, lost or sad in general		7	
feel calm, stable, peaceful or relaxed in general		9	
start with curiosity	end with being involved in the experience and forgetting the environment		8
	end with being excited, pleased, interested or attracted		6
end with calming down	start as being curious and scared		1
	start as being confused and scared		1

ended as calming down. The ways of how they described the emotion of "*scared*" were mostly mixed with other emotions, such as being curious and scared or being confused and scared. Three of 19 participants in condition 2 gave the response that they did not know how to describe their emotions in the experience.

The participants in condition 1 had relatively simple emotional responses in their experiences. Seven of the 20 participants felt "*isolating/lonely/being lost/sad*". Nine of 20 participants mentioned that they felt "*calm/stable/peaceful/ relaxed*" in their experiences. Four of 20 participants in this group answered this question with expressions such as "hard to say my emotion".

3c: Overall interpretations are various in condition 2 bring the actual experience close to what the practitioner intended.

One question is related to an overall understanding: "What is the meaning of this installation according to your views? Could you please explain?" (Table 7.8)

In condition 2, participants gave varying answers to this question and described the overall understandings through the expressions such as: "*outer space*" (3 of 19); "*sea/ocean/water*" (6 of 19); "*memories*" (4 of 19); "*communication/connection/dialogue*" (2 of 19); moment for "*empty and free mind*" (2 of 19); "*the eye of the god*" (1 of 19); and "*like in the cinema, for art people*" (1 of 19).

Table 7.8: Comments about interpretations in two conditions - condition1 (without interactivity) and condition 2 (with interactivity).

interpretations	Condition1(without interactivity) (N=20)	Condition 2 (with interactivity) (N=19)
feel the installation about outer space		3
feel the installation about eye of GOD		1
feel the installation about sea or ocean or water		6
feel the installation about memories	7	4
feel the installation about communication or connection or dialogue	2	2
feel the installation about the moment for empty and free mind	2	2
feel the installation about the cinema for art people	1	1
feel the installation telling a story	6	
without conclusions	7	

The participants in condition 1 described the overall under-standings through the expressions of "*telling a story*" (6 of 20) and reminding of "*previous life*" and "*memories*" (7 of 20). The rest of participants mentioned their experiences without conclusion, such as: "*meditation*" (1 of 20); "*transforming*" (1 of 20); "*being alive*" (1 of 20); and "*getting lost*" (3 of 20), and "*stress*" (1 of 20).

7.5 Discussion

In the remaining sections, I will discuss three aspects of the measurements - aesthetics, engagement, and variety of interpretations separately.

7.5.1 Aesthetics

The results from the AttracDiff2 questionnaire are used to analyse the aspect aesthetics in the experience. The results from the AttracDiff2 questionnaire show that condition 1 and 2 could not be distinguished in terms of pragmatic quality (PQ) and hedonic stimulation quality (HQS). In Hassenzahl's model, pragmatic quality (PQ) is used for the effective and efficient goal oriented achievement and hedonic stimulation quality (HQS) is related to basic human needs (e.g., development of knowledge or skills) (Hassenzahl, 2003,

2004). Meanwhile, the results appear that hedonic identification quality (HQI) and attractiveness quality (ATT) are the two positive factors in condition 2 comparing to condition 1. In Hassenzahl's model, hedonic identification quality (HQI) addresses "*the human needs to express self through objects by communicating important personal values*", and attractiveness quality (ATT) is influenced by both pragmatic and hedonic qualities (Hassenzahl, 2004, 2003; Hassenzahl et al., 2015). The installation provides an overall attractive experience or beautiful-to-experience more with interactivity than without interactivity, but without effects on efficiency, effectivity, and development of knowledge or skills.

The AttracDiff2 questionnaire is not designed as a measure for explaining the experience qualities in installations. It is indeed used for evaluating aesthetic qualities, whereas it is often used in the experiments for websites, traditional products, or interactive products (Frens, 2006; Hassenzahl et al., 2006; Karapanos, 2013; Lindgaard et al., 2006; Tractinsky et al., 2006). The experience in an interactive installation is more complex. For instance, the word pairs in this questionnaire are hard to be used for describing the experiences in this installation. Some participants said it was difficult for them to make a choice between items "*confusing*" and "*clearly structured*", or "*isolating*" and "*connective*" (see Appendix 3, item NO.6 and NO. 8) because their experiences were "*mixed with the feelings of confusing and clearly manageable, or isolating and connective*", or they described their experiences were "*started with isolation, later on became connective*". Moreover, as I described in chapter 6, *HEART IS THE ONLY WAY* was not aiming at offering usability. The offered experience was intended to evoke emotions in the participants and to be thought provoking. It offered a self-reflection experience rather than a task-solving mission.

7.5.2 Engagement

The User Engagement Scale is used to operationalize the term - engagement as a way to understand the actual experience within an interactive installation. Overall, the results from the User Engagement Scale do not lead to the solid conclusion that condition 2 is more engaging than condition 1. The factors of aesthetics (AE), endurability (EN), novelty (NO), felt involvement (FI), and focused attention (FA) are higher in condition 2 than in condition 1, but the difference is not significant.

The User Engagement Scale is designed to evaluate the level of engagement through the interactivity with a system which has no visible or physical outcomes (O'Brien et al., 2013). *HART IS THE ONLY WAY* is an immersive installation and relies heavily on the visual-auditory output. Although condition 1 took away the logic of action-reaction (the relationship between the participants' influence and the results of their influence), which did not reduce the visual and auditory output. Scores of the factor aesthetics (AE) in condition 1 and 2 range closely from 4.31 to 4.32. This set of items pertains to specific visual features. The same situation happens in focused attention (FA) which is defined by items "*pertaining to focused attention, awareness, and perceptions of time*" (O'Brien et al., 2010). The results of scores of focused attention (FA) in two conditions also show that condition 2 does not add the extra attention on the top of condition 1.

The experience in this installation was designed with a scene that contained conflict, sadness, fear, and peace were the mixed emotional responses to this scene. Thus, some items in perceived usability (PUs) and endurability (EN) might not be labeled appropriately to measure the complexity of emotions in this interactive installation, for instance, the items such as "*I found this installation confusing to experience*", "*I felt discouraged while experiencing this installation*", and "*My experience was rewarding*" (see Appendix 3, item NO. 37, NO.39, and NO. 52)

7.5.3 Variety of Interpretations

The results from the open-ended questions show that condition 2 achieves the actual experience closely as intended. Overall, the participants in condition 2 are more positive, less confused. They become willing to discuss their internal emotions and the subjective understandings of what the installation actually is.

All of the participants in both conditions gave positive feedback on the visual output. The atmosphere in the spatial arrangement and both the digital and physical materials were mentioned in the replies to the fourth question. The participants in both conditions gave varied answers to the third open-ended question which is related to the auditory output. The participants in both conditions described the background music matched the whole installation atmosphere - "*involving*", "*abstract*" and "*mysterious*". As for the recorded female voice, a similar answer from both conditions shows certain

frustration: "*The female voice makes me confused.*" or "*The female voice disturbs my experience.*" Even in condition 2, some participants mentioned they could not see any logic between what they spoke and what they heard from the female voice. There still was positive feedback about the female voice, such as: "*I would not understand Chinese, confusing in a good way.*" or "*Female voice reminders me my friend's voice.*" Some participants provided neutral on female voice: "*Mix with the background music and female voice is interesting.*"

The relevance between the first and second open-ended questions surprises me in that interactivity and emotional responses go hand in hand. The relevance indicates that the participants in condition 2 grasp more easily the expressed emotions. This part of results shows that the interactivity plays a positive role to help the participants experience the installation as an emotional process. For instance, the participants in condition 2 described their emotions as a process - being scared then slowing down and finally calming down.

The participants in both conditions tried to figure out "why it happens" and "what it is" in their experiences. For the answers to the fifth open-ended question, the participants in condition 2 relied more on the logic of action-reaction. It seems that the interactivity integrates the relationship between the installation and every individual participant during the experience and forces the participants to consider more within the relationship between the installation and themselves. For instance, 11 out of 19 participants in condition 2 understand this installation as communicating with a mysterious and attractive object, for instance, "*outer space*" or "*sea/ocean/lake*". Whereas in condition 1, the participants are passive and they mention that the installation is telling a story.

7.6 Reflection

The following sections describe how DSPI helped me go through three forms of negotiation in this process and achieve the actual experience as close as intended.

7.6.1 Intent and Intent Transformation

The evaluation results show that the participant's experience also can be seen as a process from the participant's perspective. The logic of the interactivity strengthens the participant's experience in the

process. As what the participants mentioned, by interacting with the installation, they experienced "what is this" at first, "maybe it is this" in between and "oh, that it is" at the end. The participant's experience proves that following both the DSPI approach and four elements within *Drama* helps the intent transformation to have the variety of interpretations which closely related to my original intent.

In *HEART IS THE ONLY WAY*, the intent just exists in my mind. The component *Drama* specifies the intent into four different elements - theme, metaphor, conflict and emotion which are transformed into the *Story* and *Production*. From the perspective of a participant, the level of the acceptance or the understanding of the intent shall not be a direct evaluation criterion for defining the success of an interactive installation. Whether the intent transformation is achieved or not at times lies more in how the participants see, hear, feel, and interact with the four elements within the *Drama*. In this installation, these four elements are assessed with the open-ended questions for their potential in influencing the degree to which the intent can impact on the actual experience. For instance, some participants mentioned that the materials and their impact on this installation reminded them of the situation in which they stood before water (e.g., the view of the lake or the sea). Other participants said that the whole spatial arrangement created an environment which did not belong to the reality on earth (e.g., the outer space). The spatial atmosphere, both the physical and digital forms and the effect of the visual-auditory output offer the participants a lens to see the intent.

7.6.2 Desired Experience and Actual Experience

From the perspective of a participant, the evaluation results, especially from the results of the open-ended questions, the visual-auditory output enables the participants to immerse in the individual experience in which they can feel the beauty of the installation and they can look at this installation for long time. Although some participants mentioned that they could not understand interactivity, most participants still felt the whole experience was impressive through speaking to this installation, seeing the images going forward and backwards, and hearing the unknown female voice as an echo to response what they were doing.

Some suggestions from the evaluation results are about how to improve the actual experience. For example, one of the participants suggested using button presses instead of using a microphone to

interact with the installation. She recommended this option because she assumed that it was a waste of time to find out how to interact. Another participant suggested that the indications regarding the direction to follow could be useful for the participants to know what they should do in the dark space. In response to this, figuring out how the installation works is already half the engagement of the experience. Based on these, the desired experience is not only achieved by accessing aesthetics and engagement, but also achieved by perceiving aesthetics and engagement in time and in the process.

7.6.3 Installation-Audience Relationship

Interactivity has enabled an experience in which audience and installation "*enter into a dialogue that is more than just psychological*" (Schraffenberger et al., 2011). In *HEART IS THE ONLY WAY*, the interactivity is an indispensable part of the installation-audience relationship which consists of the known and perceived aspects of the participants' being in their experience. The different combinations of position and speech input (from the audience) and visual-auditory output (from the installation) are designed into three different states of the interactivity in this installation. These states of interactivity were explored by the participants. The participants in both conditions tried to figure out "why it happens" and "what it is" in their experiences. The participants in the installation without interactivity found that the artwork was telling a story which forms as a passive experience. The answers to "why it happens" and "what it is" in the installation with interactivity relied more on the dialogue of the actions and reactions between the installation and the participants. One of the participants even understood the whole experience as a process of building a dialogue. The dialogue forced the participants to consider more about the relationship between the installation and themselves. For example, 11 participants in the installation with interactivity understood their experiences as an active experience instead of a passive one. Therefore, the interactivity in the final installation created a better dialogue between the installation and the audience.

Acknowledgements

REFLECTION ON CYCLE 3

Figure 7.4: DSPI in *HEART IS THE ONLY WAY*.

This cycle includes the design process of *HEART IS THE ONLY WAY* and the evaluation of the actual experience. The use of DSPI and the evaluation results together offer several insights of how DSPI helped me go through three forms of negotiation in the process and achieve

the design of an experience that relates my intent to the audience at the end. The use of DSPI was as follows (Figure 7.4):

(1) In general, DSPI was not linear. There were several iterations between *Story* and *Interaction* in the process. *Drama* had been a prerequisite to produce intent transformation. To *Story* a desired experience, iterations were followed through to improve the *Production* and craft the *Interaction*.

(2) Four elements within the component *Drama* - theme, conflict, metaphor, and emotion were expected to be experienced by the audience. The transition from *Drama* to *Story* in this case relied on the live performance of actions which helped to transit "my" point of view to "their" points of view. Therefore, in the design process, these four elements were designed to be seen, heard, felt, and interacted by others. The evaluation results showed that the four elements within the component *Drama* had impact on the audience experience. The level of understanding of the intent depended on how the audience was seeing, hearing, feeling, and interacting with these four elements.

(3) The component *Story* became concrete and completed while experimenting with the *Production* in the design process. The *Story* at first was an image in my mind. The image included individual objects (a large amount of water and a person) and a brief overview of the scene (the seascape in the midnight). The image was filled up with dynamic details during the iterative process. The experiments with the materials and the spatial arrangements served as a means to discover how the individual objects should be in dynamics. Three states of interactivity were designed to make the whole scene dynamic.

(4) The component *Interaction* played a role of reference in informing the practitioner how to improve *Production* and enhance the audience experience through prototyping, observations and interviews. Several experts were involved in the design process. The experts' experiences were observed and they were asked to give their opinions of how they felt about the prototypes instead of being asked how they thought the installation should be. Both their behaviors within and their feelings of the prototypes helped me find out if the current prototype conveyed my intent. The results provided the possible directions to push the iterations forward in the design process.

green is the warmest (2017)

*10*16cm*
oil on canvas

CHAPTER 8

OVERALL REFLECTIONS

"Evolution forged the entirety of sentient life on this planet using only one tool - the mistake."

- WEST WORLD, Season 1, Episode 1 (Nolan, 2016) 41:50min/01:08:08min

8.1 About this Chapter

Within this chapter, I reflect on the entire body of research work that was conducted in the three practice-based research cycles. In section 8.2, I outline the overview of my PhD research. Section 8.3 describes the main findings in relation to the research questions formulated in Chapter 1. Then I discuss the achievements and limitations in this work and identify new directions for follow-up research in section 8.4. I end this chapter with a reflection on this work from a personal perspective (section 8.5).

8.2 Overview

Related work drawn from literature and art practice, the analysis of and comparison between experience in performance art and experience in interactive art showed that, in the intersection of these fields, three common forms of negotiation between the artists and the audience exist: intent and intent transformation, desired experience and actual experience, and the installation-audience relationship. These three forms of negotiation were assessed for their potential in influencing the degree to which the experience designed by the practitioners could reach their audience. In response to this, the main research question of this thesis was: "How can the practitioners design experience for interactive installations such that it relates their intents to their audience?" To address this research question, I started from a new perspective based on performance theory (Schechner, 2004) which led to DSPI - *Drama*, *Story*, *Production*, *Interaction*. DSPI shed light on helping the practitioners deal with tension when negotiating with their audience in the practices. In three iterative cycles, international workshops were combined with projects by myself to experiment and to improve this framework. Cycle 1 was a view of showing how patterns emerged from using DSPI in the design process. The results of Cycle 1 showed emerging patterns in using DSPI as an approach. Cycle 2 showed what happened when DSPI was strictly used in a linear process. Observations from Cycle 2 suggested that the iterations between *Story* and *Interaction* could help the practitioners achieve the desired experience they intended to deliver. Cycle 3 was a process of a large-scale project applying DSPI in a more iterative manner. Cycle 3 ended with an empirical evaluation of the actual experience in three aspects - aesthetics, engagement, and variety of interpretations.

8.3 Conclusions

This research set out to investigate the answers for:

How can practitioners design experience for interactive installations such that it relates their intent to their audience?

Based on performance theory (Schechner, 2004), I proposed the DSPI framework. DSPI was aiming at approaching the creation of interactive artworks from a new perspective. The target user of DSPI was the group of practitioners who lack training or experience in creating interactive installations. DSPI could assist this group of practitioners in designing the experience which could be related to the audience as intended. This research question was further detailed into three sub-questions from the perspectives of three forms of the practitioner-audience negotiation - intent and intent transformation, desired experience and actual experience, and installation-audience relationship. Through the results of the three cycles, this research has been trying to unfold the possible answers for these sub-questions.

8.3.1 Intent and Intent Transformation

Negotiation 1: How can the intent reach the audience?

DSPI suggests that the intent transformation is from a subjective first-person perspective and mediates through a design process in which the four components have a combination of presented context.

The component *Drama* is an instrument to express the intent. It includes four elements - theme, metaphor, emotion, and conflict. The four elements work as a common thread going through the whole design process and are assumed to become apparent to the audience in the actual experience.

Structuring *Drama* is a process of extracting something significant from the intent. The component *Drama* in an interactive installation is not something directly to be found or picked up by the audience. For the audience who is fascinated by "how this installation works", they might be seeking for the possibilities of changes occurred as the reactions to their actions. For the audience who is confused by "why they (the practitioners) make this work", they might be more interested in finding out the hidden intent to answer the "why" question. Design of the components *Production* and *Story* offers

actionable possibilities for the audience to seek the answers for both "how" and "why" questions through seeing, hearing, feeling and interacting.

Intent transformation can also go through an iterative process. *Drama* including its four elements helps the practitioners to explore how their intents could be "received" by the audience in the end. The level of the acceptance or the understanding of the intent is not necessarily an evaluation criterion for defining the success of an interactive installation. Whether the intent reaches the audience or not, at times depends on how the audience is seeing, hearing, feeling and interacting with the proper representations of the four elements which are together a probe for the audience to "receive" the intent, further to understand and interpret the installation through experiencing it.

An alternative way to say that the intent reaches the audience is that the interactive installation evokes the intent in the audience. Perhaps, I should say, to evoke the intent in the audience under certain conditions. Evoking the intent can be hindered by factors such as the practitioner's personal skills, abilities, and even the talent, and the practical reasons such as available technologies and the production budget. The transformation of the intent is not in the same sense something that comes in at one end and out at the other transformed. However, DSPI can be used for the intent transformation in the design process between its start and its end, and the intent will affect the experience and produce related resonance.

8.3.2 Desired Experience and Actual Experience

Negotiation 2: How to bring the desired experience closer to the actual experience?

The desired experience is the experience the practitioners want to deliver. The actual experience is the experience the audience can actually receive. The goal of bringing the desired experience closer to the actual experience requires the practitioners to develop an understanding of both "what kind of experience to deliver" and "what kind of experience their audience can receive" in the design process. DSPI helps in thinking about the connection between these two.

By using DSPI in the design process, the desired experience can be developed in the process of "storying" the possible behaviours and

the resulting responses in the interactive installations. A well-developed component *Story* is a pre-condition of the actual experience being closer to the desired experience. The component *Story* also can be completed while developing the *Production*. The iterations between *Story* and *Interaction* help to bring the desired experience closer to the actual experience.

The evaluation of *HEART IS THE ONLY WAY* offered the insights that the participants could access "aesthetics" and "engagement" to certain extent in their experiences. From the results of open-ended questions, it was evident that this installation enabled the participants to immerse in an individual experience in which they could feel and interpret the installation from their individual perspectives.

8.3.3 Installation-Audience Relationship

Negotiation 3: How can interactivity play a role in installation-audience relationship?

Interactivity produces stimulation for the audience, whose interactive actions are to complete an interactive installation (Kluszczynski, 2010). The process of experiencing an interactive installation is not only the process of grasping the intent, but also the dynamic process of communication between the audience and the installation. In DSPI, the interactivity is the means to facilitate the process of the communication. The design of interactivity in DSPI happens when moving from *Story* to *Production*. Interactivity helps the practitioners complete *Story*, being a medium to make communication possible. Therefore, DSPI suggests that the practitioners shall consider the interactivity as a means of establishing and maintaining the installation-audience relationship. The results of three cycles showed that the interactivity had never appeared out of nowhere. The design of interactivity was always based on a solid *Drama*. Especially in *HEART IS THE ONLY WAY*, after the iterative process, the final interactivity provided progressively higher and more complex levels of knowing, understanding and reflecting on the installation-audience relationship. The interactivity is an indispensable part of the installation-audience relationship which consists of the known and perceived aspects of the audience's being in their experience.

Overall, the three relevant forms of negotiation are addressed in DSPI for their potential in influencing the degree to which the experience designed by the practitioners can reach the audience.

8.4 Discussion and Limitations

In this research, DSPI has been used by different practitioners (design students and myself as practitioner) to investigate how their intents were related to their audience when designing experiences for interactive installations. Using workshops and own designs as the method, this research could explore more on capitalizing on strength preference and reaching some amount of objectivity. In my own projects, I focused on realising my original intent through DSPI. Although the practicalities might have affected the final results, to a certain extent, DSPI worked out as a useful means for negotiating with the audience throughout my design process. By using DSPI, I gained awareness of the audience's experience within my interactive installations and audience's interpretation through experiencing, which shaped the desired experience towards the actual. Six international workshops were used as probes to investigate the pattern, the process, the results, and the reflections of using DSPI in practice. DSPI offered the design students a new perspective of thinking and marking. These students built confidence in the field of interactive art which was not familiar to them before. They reflected on their own process and examined how they had used DSPI to create and improve their interactive installations. These workshops, on the one hand, were helping individual design students to broaden their skills and understanding in designing interactive installations. On the other hand, the workshops gave me an opportunity to explore, to gradually position, to extend my reach, to go beyond my own idiosyncratic bubble, and to have sense of objectivity outside of my own specific lens of looking at these things.

In general, DSPI is not meant to help the practitioners to answer the subjective questions such as: "What is the intent to start this artwork? What is the relationship between the intent and the practitioner's own life and life experience?" DSPI does help the practitioners to answer the practical questions such as: "How to relate the audience experience to the practitioner's intent?" This research provides a clear framework - DSPI for designing the experiences for interactive installations. The main part of this thesis was to demonstrate how, in certain conditions, the experience in an interactive installation could be designed to reach the audience as intended. Using this framework, the practitioners who do aim for achieving this can build upon DSPI to advance their own practices. In the educational context where theoretical frameworks are important, this work will offer both the guidelines for making and a framework for analysing in art and design education.

"*Interactive Art is of great relevance to the arts, interaction design, sciences and technology alike*" (p1, Schraffenberger et al., 2011). However, there are several limitations yet to be addressed in future research. With regards to the length of this study, performance theory was not fully explored or addressed. This thesis started with the theatrical elements and delved deeply into the performance theory from Schechner's approach. Because of the interdisciplinary nature of the research, the DSPI framework proposed in this thesis could potentially be further developed if contextualized more with the performance theory and Human-Computer Interaction (HCI) principles. Moreover, philosophical and psychological theories related to performance and art could have been explored as well to provide this research with future developments.

This thesis concluded that interactivity plays a role in dealing with the tension between installation and audience. However, this research involved only very limited means of interactivity when designing experience for interactive installations. Some research results from Human-Computer Interaction (HCI) such as the concept of social interaction (Hu et al., 2014a) would help realise new ways to explore the interactivity in designing experience for interactive installations in social, possibly multi-user and distributed settings.

Besides, DSPI provides one of the possibilities for the practitioners to bridge the gap between the intent and the actual experience of the audience when designing interactive installations. In this research, DSPI has been formulated and structured step by step when answering the research question. The effect to improve DSPI in this research has generated benefits. In these cycles throughout the whole research study, whereas the initial chapters are of an exploratory nature, the final chapters show a systematic deployment of scientific evaluation methods, both regarding the process and regarding the end-user's experience. Cycle 3 is a good demonstration of the way the structured DSPI approach resulted in good perception of the artistic intent by various individuals after interacting with the installation. What should be also taken into account is that to investigate how effective DSPI when compared to other approaches in the field of interactive (public) installation. If the use of DSPI and other approaches can be compared with the different control student groups in the workshops, the results will shed light on broader discussions and identify effective steps to enhance DSPI.

8.5 Personal Reflection

Practising a particular creative art can contribute to academic research (McNiff, 1998). I dedicate the final section of this thesis to a reflection on the two conflicting roles played by myself in my PhD: being an artist and being a researcher.

With a childhood enriched with drawings and paintings, for me, art was the memory of repeated practice, over and over again. Before reaching the age of ten, my life was filled with rice paper, drawing brushes and Chinese ink. Quite often, for a very common and simple plant painting I had to practice for several months until being satisfied by my father who is a traditional Chinese painter. Throughout the whole high school, every evening, even in public vacations, and weekends, I was locked inside my room by my parents to keep practicing all kinds of plaster figures, portrait figures and landscape sketches. After I started my study in Nanjing University of the Arts, I was introduced to the world of lacquer painting and oil painting by professors and artists Li Yongqing and Mo Xiong. To get familiar with these tools and materials, to master the characteristics of tools and materials, and to express my inner intent, I realized the necessary metamorphosis of artwork could only happen after repeated tempering. I understood that passion or talent alone could never take the place of skills and practices. Although there are many talented painters' overnight success stories, the necessary metamorphosis of artwork can only be produced through repeated practices. What these professors often told me was that I must follow my "feeling" in my practice because it was always "right". What I used to do was that I kept practicing to strengthen my intuition. I seldom revealed my knowledge through art-making process.

My PhD project started in an environment which was different to what I was used to. The mission of doing PhD was aiming at producing academic knowledge, and design/art practices were just a means to achieve this - this was not like the mission I used to work on at an art university. Besides, TU/e as a Technology University indeed gave me a challenging condition to start, continue, and complete my work. I feared technologies at the beginning because they were so "far away" from me. Communication with other colleagues was always broken because we could seldom find the topics with mutual interest. It took me one and a half years to deal with the pressure and learn how to "survive" this situation. Even though, I still knew my interest was to create and make something. I started my PhD with the raw motivation to investigate how to design experience

for interactive installations. Rather than beginning with literature, I chose to just create something first - without theoretical knowledge and even without personal skills in interactive technologies at that moment. I tried to learn how to embrace practices so as to strengthen my research work because "*the research, with the practices, could be used as primary modes of inquiry, especially when it came to exploring the experience of art and its creation*" (p.30, McNiff, 1998). Rather than just reflecting upon artistic phenomena in case studies, interviews, and other explanatory texts, my PhD also included my own practices to learn more about particular aspects of interactive art and to elicit the personal intent for the audience experience to a "good" interactive installation. I might, at first, miss the process of intellectualising the practices but might later find that reflecting on my work and my methods was helpful and valuable, something which, I certainly did in my PhD. I described my projects in the previous chapters, a process which helped me gain new insights and sensitivities towards my research questions, and helped me learn how to choose the right ways (for myself) of observing situations and solving problems. Practice and research in my PhD were mixed in an iterative and spiraling process - creating the work, reflecting and evaluating what I have done, going back and creating next iterations where the rationality (scientific theories and knowledge) and irrationality (my experiences, my feelings, and my art) were mixed in the process.

Looking back at four and half years of doing my PhD, I have become more and more aware of the continuous conflict in me between being an artist and being a researcher - with focus on particular art projects on the one hand and the development of an overarching theory on inter-disciplinary art practice on the other hand. I feel that the conflict lies in the mix of rational and intuitive processes where research cannot reliably identify and generalize from all idiosyncratic elements of artistic practice. At the same time, artistic qualities are found in that what is the vague and ambiguous, which needs further research. It took me time and efforts throughout this journey to find a balance between my artistic values and the merits of scientific research. I have learned how to involve myself in the ways of doing research without losing touch with my artistic roots. Negotiating what is best and important for a project as a whole helps me to bridge between practice and research and allows me to move forward in expressive creation.

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APPENDICES

Appendix 1: Questionnaire of audience experience in workshop Nature[1]

Your name: _____

1: Are you male or female? male/female

2: What's your age (e.g.,21)?

3: Please specify your culture background (e.g., Dutch, or Chinese).

4: Please specify your studying background or working background (e.g., student, teacher, officer).

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1 Exhibition guide and interview questions were together distributed to the visitors. The visitors were asked to follow the suggested path: 2. installation *Twinkle Wink*; 5. installation *Humble*; 8. installation *The Dandelion*; 7. installation *irespect*; 6. installation *UNSEEN*; 4. installation *Hui*; 1. installation *SOLOS*; 3. installation *Inner Peace*. This exhibition guide was made by Marleen van Bergeijk.

5: Please pick the two group installations you like most (see attached map):

Group: _____   Group: _____

6: Please explain the reason why you pick these two installations according to overall quality.

7: Please explain the reason why you pick these two installations according to interactivity.

8: Please explain the reason why you pick these two installations according to the messages that they try to delivery.

9: Can you briefly describe how you feel in general about this exhibition?

Any other comments:
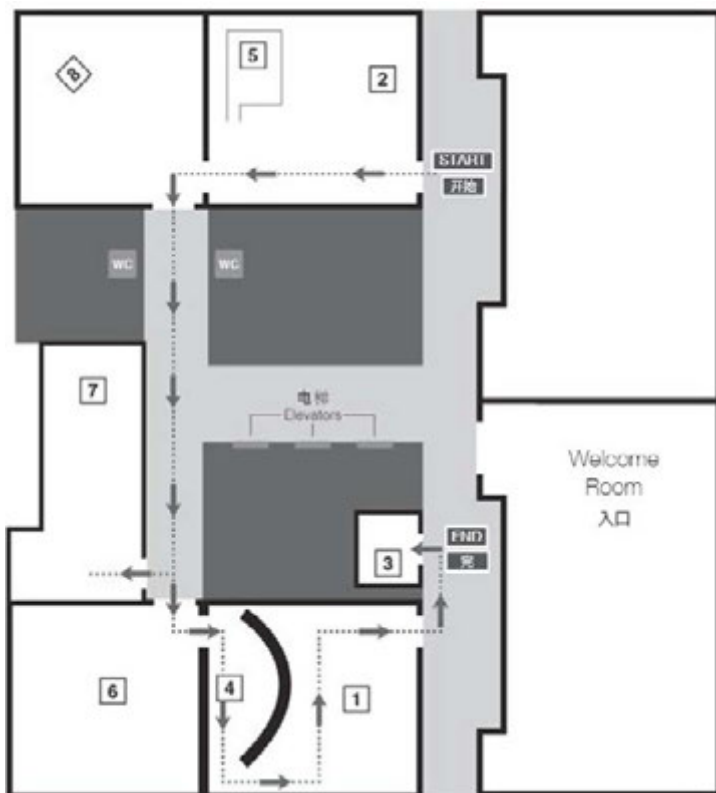
Appendix 2: Selected quotes from students' reflections on workshop Nature.

1: This drama-story-interaction-production (DSIP) structure felt a little forced at first. (P 1)

2: Over time, I realised that the structure was a great foundation of communication. (P1)

3: These elements were something that each group member could comprehend. (P1)

4: The concept development to the steps in the DSIP structure made it easier to explain ideas right through the language barrier. (P1)

5: Finding and defining our drama was an enriching experience due to the influences of Chinese culture. (P1)

6: Conflict in drama was more or less universally interpreted in our group. (P1)

7: Subsequently choosing the right emotion in Drama to go with that conflict proved much more difficult. (P1)

8: To speed up the process, we decided not to get too hung up on finding the exact emotion in Drama with our installation, but to focus on the interaction instead. (P1)

9: the DSIP structure-guided us well, at times it was beneficial to let go of it. (P1)

10: DSPI turned out to be helpful to simplify the design process by simply asking questions like: what is your favourite thing in nature? Or: what kind of interaction would you like to create? (P1)

11: I spent quite some time trying to move our concept into a more abstract direction. (P1)

183: I decided to direct my energy elsewhere to avoid frustration within the team and to further the process. (P1)

12: The final installation might not be as abstracted as I would have liked, but in the end it worked well with the aesthetic my teammates chose for it. (P1)

13: In the end, this process was less about calculating the differences between our cultures, and more about finding common ground. (P1)

14: Building the installation was actually more of a challenge than I had expected it to be. (P1)

15: I was quite happy with the installation that we built – especially the tangibility of it, as many of the other installations used hand or body motion to trigger interaction. (P1)

16: I noticed that my of the visitors responded well to the physicality of lighting the candle and then seeing the results in the projection. (P1)

17: I believe our installation could have been more overwhelming if we had focused more on the characteristics of fire, destruction, growth and hopefulness, rather than the actual image. (P1)

184: the fact that we used actual elements from nature … really connected well with the visitors of the exhibition. (P1)

18: Overall, I'm pleased we managed to build an installation that held its own on the exhibition, while simultaneously maintaining a process in which I could develop my (weaker) skills. (P1)

19: Within DSPI process I saw a lot of connections with the poetry in design module, in which we also started with something very abstract. (P2)

20: This time we had to come up with the drama ourselves, which was quite hard since the communication was not always that easy. (P2)

21: This workshop taught me a rather self-driven design process: instead of designing an interaction based on the requirements of the user. (P2)

185: we had to design the interaction based on the experience that we wanted to give to the audience. (P2)

22: This workshop taught me that not every decision should be based on (user) research. (P2)

23: And (this workshop) taught me how to capture what & why I want to give the user a certain (emotional) experience. (P2)

24: This process perfectly matches my vision, in which I want to give the user a certain experience to inspire them to find suitable solutions themselves instead of giving the solution right away. (P2)

25: I had not only to consider an intimate user & product interaction but the full process of approaching the installation. (P2)

26: It made me aware of thinking about the whole experience a product should have. (P2)

27: When we were designing the interaction I have learned that adding interaction to an installation can make it very messy and influence the atmosphere you want to set as a designer. (P2)

28: Eventually all the interactions of the installations became simple and in this way the message was communicated stronger. (P2)

29: I realised that it is important to let the interaction speak for itself: don't make it too complex so it does not need any explanation. (P2)

30: Eventually, in the production phase, I discovered that by discussing the drama so much, we had created a common understanding of what we aimed for in the installation. (P2)

31: I realised that sometimes I tend to forget that the process will improve the concept; I have the feeling everything has to be perfect from the start. (P2)

32: I think also really good to force myself in being more confident of making decisions on my own in the design process. (P2)

33: all these materials forced us to think outside the possibilities of our workplace vertigo, look into the possibilities of the world around us. (P2)

34: we realised that when we added technology to our installation the focus shifted from our drama to the feasibility of the technology. (P2)

35: sometimes I tend to lose the strengths of the concept because I only focus on the realisation. (P2)

36: If we would have more time I would like to have done another iteration on the installation to improve the interaction and with that the experience for the audience. (P2)

37: The first thing I noticed regarding our design process, was that the culture difference was inherently part of the work we were able to perform, and subsequently the design process. (P3)

38: As opposed to standard user-centered design, this process was more self-centered. (P3)

186: we were to design from a personal 'drama'. This was then followed by 'story', 'production' and 'interaction' subsequently. (P3)

39: drama = design brief (P3)

40: story = design scenario (incl. persona's etc.) (P3)

41: production = implementation (incl. concept/prototype) (P3)

42: interaction = production + audience (P3)

187: the design process was strictly linear. (P3)

43: The design process is opposed to our own framework, which is linked and not linear at all. (P3)

44: I often struggle with translating my 'drama' into a concrete concept. (P3)

45: I think it is a very good idea to implement this design process in my own projects. (P3)

188: I always have a hard time translating my emotions (vision) into a concrete/ rational design. (P3)

46: When I design something from a 'drama', I also have to try to translate an emotion into a rational, concrete product with a function. So in a sense, you give function to emotion. (P3)

47: When I applied the drama-story-production-interaction process to my previous designs, I noted that this has a very similar problem. There is a big gap between story and production. (P3)

48: I found that the big gap between story and production can quickly cause loss in the 'essence' of the drama. (P3)

189: We combined different ideas and this happened to match the limitations to form a well-structured concept. (P3)

49: One way to fix the big gap between story and production could be by using choreography or performance. (P3)

50: A better way to fix the big gap between story and production would be to systematically apply the limitations. For example, start by defining a technology (considering skills), and then work your way up. (P3)

51: An even better solution to fix the big gap between story and production would be by using/combining this with an EDLlike approach. Quickly switch between short iterations while implementing new limitations towards the audience and see how much the drama is still present in the final interaction. (P3)

52: I believe that this design process could be a very strong tool to create a bridge between the emotional and rational. (P3)

190: …the use of space. …This is because the installation literally reflected the space back, interacting with everybody present. (P3)

191: An interaction doesn't have to be defined by the technology, and one should always put the technology in the context of the design to see if it is necessary to bring the message across. (P3)

192: In our case the interaction became much more powerful without the use of programming. (P3)

194: It is important to be able to mediate between interaction and production. (P3)

53: DSPI process has helped my team to analyse and structure feelings & emotions (drama), what resulted in a fixed foundation for the rest of the process. (P4)

54: The drama and story stage made sure that there is a certain common understanding on the most fundamental level. (P4)

55: The drama was not one big gut-feeling we all had; it was almost rationally created by ideation sessions around the question "What is nature?" (P4)

195: I had the feeling that we could not come up with a drama where we were all 100% committed to and understood. (P4)

56: This missing commitment to and understanding of the drama was especially visible in the dissimilar priorities in the process we as individual team members had in the further stages of the process. (P4)

57: I feel that the gap between story and production now provided too much freedom of interpretation what the production should be like. (P4)

58: Story does not naturally flow into production, although it should already give away the experience. (P4)

59: I think that production and interaction should be convertible, because that allows doing iterations. (P4)

60: I think that the strongest part of this DSPI method is the addition of structure to feeling. (P4)

61: This this DSPI method makes it a lot easier to translate into design and to communicate it to others. (P4)

62: A drama is not a good drama when it is not felt by the whole team. (P4)

63: I think the method has a higher chance of success when I apply it on my individual projects. (P4)

64: The method we have used is very self-centered as being a method that does not begin with the input/need of the user, but out of a feeling from ourselves. (P4)

65: within the DSPI method (and the module), we have validated our assumptions/ emotions with some elements out of the story (as social and cultural background) that are related to a bigger group of people than just ourselves and I have initiated to hold interviews to have some user input & inspiration. (P4)

66: it is an artistic way to let people think and reflect about life and the society. (P10

67: Not just shifting from a very personal 'drama' to a user-centered product, but carefully consider if and how every detail of the design expresses parts of the drama and my identity. (P4)

68: This DSPI method has pinpointed that when I want to express this feeling (and therefore my identity) in my end product, I need to take the time and do all of the steps. (P4)

69: Designing art (installations) have influenced my identity as designer as such that I would like to have a bigger emphasis on affordances and multiple using modes in my concepts. (P4)

70: This showed me that during such a tough process it is necessary for me to show what I feel and take time alone to gain energy again to continue and not to lose myself in my feelings. (P5)

196: I am able to capture the process from start to end. This is done by using a creative approach. (P5)

197: following a design process and connecting, collecting different people that could help me with teaching me skills to complete steps in this design process. (P5)

71: While having energy taking processes I have to create a strict healthy day program for myself to keep up with the workload and collaboration. (P5)

198: this depth can create a bigger value towards concepts and end products. (P5)

72: During this process it became clear that I as a designer at Industrial Design am educated in a way that I am able to be a creative manager in a multidisciplinary project. (P5)

73: For this I think it is necessary to use a more Self Centered Design approach rather than a User centered Design approach. (P5)

74: Since you have to ask yourself: What do you want to reach. To get answers on this question you have to look from your own perspective. (P5)

75: Nevertheless I have the feeling that our group could present an experience of our drama at the final exhibition. (P5)

76: This experience we had created with very basic material combined with basic processing in the form of projection and sound. (P5)

77: Because of my experience now with my better understanding of depth in a product or concept I hope to apply this in my future designs. (P5)

78: Therefor I have to push myself to ask more often what I want to reach and want to tell with my designs. (P5)

199: We were able to tackle the abstract framework by just going for it step-by-step and making sure our intermediate deadlines and results were met on the right level. (P6)

79: When disagreements occurred it was mostly based on different interpretations of the design process (based on our different study backgrounds) rather than a cultural difference. (P6)

80: This process allowed us to talk on a deep level, because everybody started with their personal experiences and things they valued. (P6)

81: In our process the DSPI framework really helped as a steering guide in the process. (P6)

82: The DSPI framework gave direction, in the multicultural and interdisciplinary cooperation it was very convenient to have a structure that we could follow. (P6)

200: We have also used self-written poetry to express our drama and stories into words we all related to. (P6)

83: The language barrier was difficult sometimes yet the process of talking about deep or abstract topics has connected us on a personal level too. (P6)

84: The phase of establishing a drama is a very essential step as it forms the foundation for your design. (P6)

85: Next this this I also notice how creating a drama as a team has connected us and put us in a situation where we were all committed to the process, willing to realise what we believed in. (P6)

86: This framework of course very powerful and true with such an art-related goal in mind,

201: I can also relate this framework to design processes where a team's common goal might be a more functional design. (P6)

87: I will definitely use this framework as an inspiration of starting with something ‚deep' in a team-design process for future cooperation. (P6)

88: In working with the framework the translation from drama-story towards production-interaction turned out to be quite a step. (P6)

89: It was difficult to translate the story and the drama into an installation form that allowed people to experience your drama. (P6)

90: On the other hand it was also difficult to remain the values of the drama when you start thinking in possibilities from qualities of technologies and materials you can use. (P6)

91: This point of translation is so difficult because it requires multiple processes at the same time. I think it is key not to lose sight of your core values. (P6)

92: Working with this framework and especially struggling with this translation from abstract to concrete I become more aware of what it takes to create a valuable experience for your audience or in industrial design, your users. (P6)

93: I however, have never used the ‚desired experience' as a starting point for my designs. (P6)

94: This framework serves as a tool and eye-opener for me on how to stage an experience as a designer. (P6)

95: More about how I will apply this in my process in my next reflection. (P6)

96: The process of this module the design process and the ideation was driven by ourselves and our own values, self-centered design. (P6)

97: Next to creating something meaningful and functional, design offers, like art, a way to express a part of yourself as a designer. (P6)

98: now I start to appreciate creating things that have a deeper layer of abstraction, which can make them more meaningful or poetic. (P6)

99: I think this self-centered design process or at least the process where you establish a deeper experience for your users can be applied for product design as well. (P6)

100: Next to the functionality the experience and how people will interact with your design is very important. (P6)

101: This DSPI approach provided me with the tools to establish an experience for my designs, something I value in my vision and I am now also more able to realize because of this two-week process. (P6)

102: This DSPI approach demonstrated to me that embodiment also suits me in my design approach and is a beautiful way to come open up a conversation towards deeper insights, even and especially with people from different backgrounds and cultures. (P6)

103: This DSPI approach learned me how to create an experience for your audience, coming from a deep, inner poetic feeling. (P6)

104: With a process inspired by the framework we addressed during the workshop I think I am able to think more about the experience I want users to have when interacting with my design, rather than just the functionality alone. (P6)

105: I learned that outsourcing manufacturing of parts for my prototypes can safe me time and will improve the quality. (P7)

202: the whole experience of your product is at least as important as the physical object itself. (P7)

203: I want to use this knowledge in my future exhibitions to create atmospheres around my designs that improve the user experience. (P7)

106: I noticed that an emotion driven process can result in a really interesting product. (P7)

107: Next to the human mind, also the human body plays a big role in art. (P7)

108: That is why acting out can be very helpful, and in international contexts it is even more helpful because body language is an international language. (P7)

204: the artistic elements and basic interaction made people curious and willing to interact with it. (P7)

205: We should pay more attention to the relationship among the audience, the space and the installation. (P10)

109: In future projects I would also like to use my insights from observing people interacting to improve the experience and interaction. (P7)

110: The drama served as a source of inspiration to generate design ideas, and enabled us to use metaphors. (P7)

111: Furthermore drama was the link between all the team members, because we could communicate ideas to each other by using the drama. (P7)

112: I compare the drama with the main purpose of a product, the essence. (P7)

113: Having a drama can help me to keep on track in my design processes. (P7)

114: In the future I want to define the essence of a design project before I start designing in order to keep on track. (P7)

115: One aspect of the story was to create a certain experience for the people who interacted with the art installation, to communicate a message. (P7)

116: Defining a story with a plot also helps to make design decisions. (P7)

117: Defining a story is also comparable with using storyboards to visualize how users use products and systems. (P7)

118: During the design process we experienced a gap between the story and the production phase, like other groups did. (P7)

119: We solved a gap between the story and the production phase by iterating between those phases and by adding and deleting elements of the story to make it coherent with our installation. (P7)

120: I think the gap between the story and the production phase could be filled with the morale of the story, which often can be phrased in one sentence. (P7)

121: Also the installation should be able to "communicate" the drama in one sentence, one interaction. (P7)

122: I believe a morale, in our case that sometimes people should not act as a group but as an individual in order to survive, could be translated to a physical installation using metaphors. (P7)

123: I noticed that I valued the drama higher as we moved further in the design process. (P7)

124: In the beginning the function was not completely clear, and when we started to use drama as the support for our design it made sense. (P7)

125: with drama related theories which require enough thinking time. (P7)

126: I want to use this experience in the future by not giving up on a theory right at the start when it does not make sense. (P7)

127: The drama-story-production-interaction framework helped to translate our drama; the circle of life, into a meaningful interaction. (P8)

128: The drama-story-production-interaction framework resulted in multiple layers of meaning in the interaction from a designer's point of view.

206: the mysteriously interaction we provide to the audience will trigger them to search for a deeper meaning in the interaction with our installation. (P8)

129: The drama part helped to determine a core feeling that the installation needs to trigger.

207: a conflict in emotions can trigger the audience to search for deeper meaning in the interaction. (P8)

130: During the module it became clear that the drama needs to be narrow in order to create focus and deeper meaning. (P8)

131: Iteratively trying to extract abstract qualities from the targeted emotion enabled our team to understand the conflict of our drama in-depth. (P8)

132: The story helped to bridge the abstract drama and the tangible production by means of fiction. (P8)

213: As designers we created this installation starting from inside-out based on the framework. (P8)

133: Fiction is less abstract and more comprehensive than drama, and it explains the journey that the audience needs to undergo in order to experience the drama. (P8)

134: The story made clear that as designer I am responsible to design the whole experiential journey, from beginning to start. (P8)

135: However, I missed tools to translate the story into production and interaction. (P8)

136: Production helped to create an actual experience for the audience. (P8)

137: interaction goes hand-in-hand with production. (P8)

138: the production is the tangible installation with which the audience can interact, and hopefully the interaction triggers deeper thoughts about the installation. (P8)

139: During the process it is important to focus on what to achieve, not on how to achieve it. (P8)

140: Technology is always limited, so it always limits the interaction; stated as the 'how'. (P8)

141: The drama-story-production-interaction framework has as purpose to create something that is very close to the heart with a deep drama. (P8)

142: The drama-story-production-interaction framework will hopefully result into a original and new creation that triggers deep thoughts. (P8)

143: At first sights this drama-story-production-interaction framework seemed straightforward and a linear process. (P8)

144: The design process was intensive and challenging, and I often noticed that I unconsciously tried to reason from the outside-in to state why the interaction should be meaningful. (P8)

208: first sights this framework seemed straightforward and a linear process. (P8)

145: This is a self-centered design approach. (P8)

146: So as a group we really tried to reason everything from inside-out. (P8)

147: At a certain moment in the process our team understood our envisioned (deep) drama, but we could not figure out how we could connect our drama to an installation. (P8)

209: At the moment we found the deep drama, we lost connection with the surface or form language. (P8)

148: I felt we really drowned in finding deep meanings in the sea of emotions while looking for it. (P8)

149: The audience experiences the drama-story-production-interaction framework from the outside-in and I hope that the audience experienced our drama by interacting with our installation. (P8)

150: I think the installation is a bit obvious and superficial in its meaning, it is a step in the right direction in communicating our drama. (P8)

151: Moreover, our installation is a stage for the audience to experience an interaction. (P8)

152: This awareness can be used in advantage. (P8)

153: If the audience interacts with the installation, will the effect by visible immediately for this audience or/and over a longer period of time for another audience. (P8)

154: In the beginning of drama-story-production-interaction process I thought that it was better to have a strong drama and story, than a good installation and interaction. (P8)

155: But after the experience of drama-story-production-interaction process I think that making a strong installation and interaction is as important as a good drama and story. (P8)

156: It also became clear that every detail of the installation needed to make sense and match with the overall experience. (P8)

157: So the subtleties in the details are really important. (P8)

158: This drama-story-production-interaction process showed me that I can enrich life by offering new experiences. I can empower people to feel certain emotions. (P8)

159: In the core of the design process there was designers' effort to convey certain message and emotions with the help of the interactive installation. (P9)

210: We wanted to create a feeling of fragility, unpredictability and postponed reaction from the interaction with the installation. (P9)

160: In the design process that we followed in the module I missed the validation part of the installation. (P9)

161: I feel that the design process that I followed in the module can be useful at some points of the product design process. (P9)

162: the design process can be useful in the early stages of the product development when designer envisions products based on personal vision and values. (P9)

163: I also believe that at later stages of the process validation with users (as well as stakeholders) and in context is necessary in order to validate the relevance of the concept. (P9)

164: This approach is clear and it sets clear goals that guide designers through the design process. (P9)

165: It also helps to have a common understanding and expectations from the process within a team, especially when working in intercultural and interdisciplinary teams. (P9)

166: I personally find that the approach is rather linear. (P9)

167: For me personally I find it difficult to work only with abstract notions. (P9)

168: Therefore if I will use this approach in the future I would prefer to make several short design iterations that would contain development of Drama-Story-Production-Interaction within each design iteration. (P9)

169: The approach gave me an opportunity to think about the ways of addressing an audience and how to communicate ideas through interactive installations. (P9)

170: For the interactive installations I can find an inspiration in performance arts and use techniques, such as staging, sound and light accents, visual effects, to convey experiences that are often scripted in advance to the live audience. (P9)

211: All the way through the design process there were small changes and adjustments to the decisions that were already taken. (P9)

171: In this project, more artistic aspects and abstract things were input….I found it was a good way to apply Chinese culture into design, we did not use any specific symbols. (P10)

172: From analyzing small elements in the artwork to make it dynamic and beautiful with processing, I saw a new way between art and technology. (P10)

173: we need to rethink about the relationship between the installation and the users. (P10)

174: the effects we expect maybe different from the real effect as it is in a large open space. (P10)

175: Public installation is not that functional comparing with products, it is an artistic way to let people think and reflect about life and the society. (P10)

176: The idea behind it should be clear for the audience and the effect of the installation should exactly reflect the idea. (P10)

177: I think the design method helps a lot as a guideline for us to build an installation. (P10)

178: The drama and story made the concept very strong and I like the approach with conflict and contrast in the concept. (P10)

179: We spent a long time on the ideation, but when it comes to production, there is a huge gap between this. (P10)

180: Also it will be more practical to think more about the audience. (P10)

181: the biggest difference between public installation and product design is the space, maybe there could be more instructions about this. (P10)

182: I think the communication skills and ideation skills I learned from this module would be very helpful for my future project and my career as a designer. (P10)

Appendix 3: Questionnaire of audience experience in HEART IS THE ONLY WAY

I. Purpose of this Research/Project

This research is done as part of a project where depth of experience in an art installation is to be developed.

II. Procedures

As a participant, you will experience one art installation. Technically you do have to experience this installation for at least 5 minutes, and less than 15 minutes. If more than 15 minutes, the investigator will let you know. Estimated duration to complete the questionnaires after experience is around 25 minutes.

III. Risks

There will be no more than minimal risk of harm involved in this activity. That is, you will be exposed to no greater risks than those encountered in everyday life. And you can stop experiencing or answering the questions any time, if you feel anything uncomfortable.

IV. Benefits

Your participation in the survey can provide insight on attitudes to enhancing depth of experience in installation arts. This insight will contribute to developing interaction on the road by engaging the audience's experience.

Your personal benefits are independent of the benefits of this survey. You are entitled to contact the investigators of this study at a later time for a summary of the research results.

V. Extent of Anonymity and Confidentiality

As a participant of this study, you will be ensured confidentiality. Your name or any other personal identification will be not be collected or recorded at any time during the study. A set-up night camera will shoot your entire experience, and this video will be only used for this research study. Later on, the interview between you and investigator will be recorded, and this audio will be only used for this research study. Any data associated with you will be assigned a number code. This study is being

conducted solely for research and development purposes, and the resulting data and interpretations will also be a part of the researchers' academic work.

VI. Freedom to Withdraw

Participation in this study is entirely voluntary and you have the right to withdraw from the study at any time you wish.

VII. Subject's Responsibilities

I voluntarily agree to participate in this study. I have the responsibilities of answer the questionnaire to the best of my ability.

VIII. Subject's Permission

I have read this consent form. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent:

Date_____

Subject signature_____

Researcher's contact e-mail: yu.zhang@tue.nl

Please fill in your basic information below:

Gender: F / M

Age:

Nationality:

Your area of expertise:

Information regarding your experience of interactive arts:

Do you have experiences with interactive art installations before?

Yes/ No

How often do you go to museums, or visit art festivals, or go to concert, or read related art articles, or websites and so on?

daily | weekly | monthly | yearly

How would you rate your acceptance about art in general?

(very bad)   1-----2-----3-----4-----5-----6-----7-----8-----9-----10   (very good)

With your help we can evaluate the installation as experienced by the subjects. Following, are pairs of words to assist you in your evaluation. Each pair represents extreme contrasts. The possibilities between the extremes enable you to describe the intensity of the quality you choose.

This evaluation tells us that the installation is predominantly likable, but that there is marginal room for improvement. Do not spend time thinking about the word-pairs. Try to give a spontaneous response. You may feel that some pairs of terms do not adequately describe the installation. In this case please still be sure to give an answer. Keep in mind that there is no right or wrong answer. Your personal opinion is what counts!

An example: cold   1----2----3---④---5----6----7   warm

1	technical	1----2----3----4----5----6----7	human
2	complicated	1----2----3----4----5----6----7	simple
3	impractical	1----2----3----4----5----6----7	practical
4	cumbersome	1----2----3----4----5----6----7	straightforward
5	unpredictable	1----2----3----4----5----6----7	predictable
6	confusing	1----2----3----4----5----6----7	clearly structured
7	unruly	1----2----3----4----5----6----7	manageable
8	isolating	1----2----3----4----5----6----7	connective
9	unprofessional	1----2----3----4----5----6----7	professional
10	tacky	1----2----3----4----5----6----7	stylish
11	cheap	1----2----3----4----5----6----7	premium
12	alienating	1----2----3----4----5----6----7	integrating
13	separates me from people	1----2----3----4----5----6----7	brings me closer topeople
14	unpresentable	1----2----3----4----5----6----7	presentable
15	conventional	1----2----3----4----5----6----7	inventive
16	unimaginative	1----2----3----4----5----6----7	creative
17	cautious	1----2----3----4----5----6----7	bold
18	conservative	1----2----3----4----5----6----7	innovative

19	dull	1----2----3----4----5----6----7	captivating
20	undemanding	1----2----3----4----5----6----7	challenging
21	ordinary	1----2----3----4----5----6----7	novel
22	unpleasant	1----2----3----4----5----6----7	pleasant
23	ugly	1----2----3----4----5----6----7	attractive
24	disagreeable	1----2----3----4----5----6----7	likeable
25	rejecting	1----2----3----4----5----6----7	inviting
26	bad	1----2----3----4----5----6----7	good
27	repelling	1----2----3----4----5----6----7	appealing
28	discouraging	1----2----3----4----5----6----7	motivating

Following, are different items to assist you in your evaluation. Five options are used to address the intensity of your attitudes about the installation.

An example:

This place is dark.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	③	4	5

29 I lost myself in this installation experience.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

30 I was so involved in my experience that I lost track of time.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

31 I blocked out things around me when I was experiencing this installation

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

32 When I was experiencing, I lost track of this world around me.

Strongly disagree   Disagree   Neither agree nor disagree Agree   Strongly agree

1   2   3   4   5

33 The time I spent in this installation just slipped away.

Strongly disagree   Disagree   Neither agree nor disagree Agree   Strongly agree

1   2   3   4   5

34 I was absorbed in my experience.

Strongly disagree   Disagree   Neither agree nor disagree Agree   Strongly agree

1   2   3   4   5

35 During this installation experience I just let myself go.

Strongly disagree   Disagree   Neither agree nor disagree Agree   Strongly agree

1   2   3   4   5

36 I felt frustrated while experiencing this installation.

Strongly disagree   Disagree   Neither agree nor disagree Agree   Strongly agree

1   2   3   4   5

37 I found this installation confusing to experience.

Strongly disagree   Disagree   Neither agree nor disagree Agree   Strongly agree

1   2   3   4   5

38 I felt annoyed while experiencing this installation.

Strongly disagree   Disagree   Neither agree nor disagree Agree   Strongly agree

1   2   3   4   5

39 I felt discouraged while experiencing this installation.

Strongly disagree   Disagree   Neither agree nor disagree Agree   Strongly agree

1   2   3   4   5

40 Experiencing this installation was mentally taxing.

Strongly disagree   Disagree   Neither agree nor disagree Agree   Strongly agree

1   2   3   4   5

41 This experience is demanding.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

42 I felt in control of my experience.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

43 I could not do some of the things I need to do in this experience.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

44 This installation is attractive.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

45 This installation was aesthetically appealing.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

46 I like the graphics and images used on this installation.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

47 This installation appealed to my visual senses.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

48 The layout of this installation was visually pleasing.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

49 Experiencing in this installation was worthwhile.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

50 I consider my experience a success.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

51 This experience did not work out the way I had planned.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

52 My experience was rewarding.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

53 I would recommend this experience to my friend and family.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

54 I continue to experience in this installation out of curiosity.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

55 The content of this installation incited my curiosity.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

56 I felt interested in my experience.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

57 I was really drawn into my experience.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

58 I felt involved in this experience.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

59 This experience was fun.

Strongly disagree   Disagree   Neither agree nor disagree   Agree   Strongly agree

1   2   3   4   5

60 Which kind of emotions did this installation raise with you? Could you please explain?

61 Did you experience that you could influence the installation in any way? Could you please explain?

62 What did you think of the sound (e.g., background sound/ reacting female voice)? Could you please explain?

63 What did you think of the projected images? Could you please explain?

64 What is the meaning of this installation according to your views? Could you please explain?

Appendix 4: Answers to the open-ended questions 60-64 in the questionnaire of audience experience in HEART IS THE ONLY WAY

P-GWO[1]1-1[2]: Isolated feeling. The changes of images do not depend on me that's why I feel isolated.

P-GWO1-2: I think I cannot.

P-GWO1-3: The sound is all around the space, it's very strict.

P-GWO1-4: Images seem like visualize the voice. I can connect it to the river and any other nature elements. I can watch this for a long time.

P-GWO1-5: I think it 's about the stress of the voice. The meaning of background female voice influences others.

P-GWO2-1: At first, I was curious then when I found the waves popping up to me, I felt connecting with the installation, that moment I felt pleasant, then I found there was no interaction. I felt frustrated. Then I felt the things just go looping, again and again, I felt a bit boring.

P-GWO2-2: No, I cannot.

P-GWO2-3: Background music did put me into the installation, but the female voice tried to push me away. I felt there was conflict, was not the same feeling.

P-GWO2-4: Really pleasant experience about the images. Images come from the end of the tunnel and come to me. Images are well done.

P-GWO2-5: This installation for me is like a child wants to say about her story, but kind of isolated from the surroundings.

P-GWO3-1: At first I was confused, then I tried to find out what's the next. The music and sound were kinds of calm.

P-GWO3-2: I cannot.

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1 P-GWO: the participant in the group of condition 1 (without interactivity).
2 1-1: the answer of the first open-ended question from the first participant.

P-GWO3-3:   Sound is very good. Chinese female voice makes me feel confused and not very comfortable, maybe I need more information about what she is talking.

P-GWO3-4: Round things like eyes. I try to find out the logic about this but I cannot.

P-GWO3-5: It is kind of things from one space to another space, physical things are changing, transforming something.

P-GWO4-1: I have a soft feeling. This is kind of feeling you always can have in the dreams, very peaceful.

P-GWO4-2: No, cannot. Only can see the light from different directions.

P-GWO4-3: Sound is quite confusing me.

P-GWO4-4: I was expecting some concrete images instead of the abstract. I was expecting the storyline for the installation. I think the light some directions are very sharp some are soft, also make me confused.

P-GWO4-5: At least giving me the feeling I am standing next to the water, at least it is romantic and loved. I really like the materials but I think maybe will be better add more colors and patterns, but I really want to know what kind of story it is telling to me.

P-GWO5-1: I feel calm, I am calm down by the installation.The installation is really alive for me.

P-GWO5-2: I don't think so. I didn't do anything.

P-GWO5-3: There are two kinds of sound. Background sound and female voice are like they are talking to each other but actually not, that makes me quite confused.

P-GWO5-4: They are very beautiful, not like what you can see from the real world. That makes me calm down, and images really bring me into the experience.

P-GWO5-5: I think it's trying to tell me something. Emotions in this installation are not very positive. But installation has a lot of stories about the life to say to the visitors. I really like the waves. I feel lost myself.

P-GWO6-1: I could describe it as a process. It's dark, at first, the structure of the installation is the first thing I see, I am thinking if I need walking around or I just need to stand there. The mood is stable and curiosity. Then I see the changes of the light, it attracts me. I feel I am quite matching to the environment. The mood reflects my imagination. The tunnel makes me think a lot of things.

P-GWO6-2: I don't feel the installation invites me to interact with it. I don't think I can influence the installation.

P-GWO6-3: I think the sound is quiet. It tries to make people calm down.

P-GWO6-4: Images are quite appealing, especially when I stand in front of the tunnel, changes of the light make me feel this tunnel is going to somewhere, it's quite inviting. I might say I want to go through it.

P-GWO6-5: For me, I would say it is related to time, some locations, and maybe a conflict of time and space.

P-GWO7-1: I think I am calm when I experience this installation. Because of the patterns of the light and also because of the sound make me feel I am in a very different space, make me forget all the noisy things.

P-GWO7-2: I didn't find I could influence the installation.

P-GWO7-3: Actually I don't know what the female voice means in this installation. I don't know what these sentences mean, but it makes me think something in my memory. Background music makes me very relaxed.

P-GWO7-4: I really like the effect, when I stand in front of the tunnel how light moves from the far to me and moves from me to the far, and the speed of this movement is changing somehow.

P-GWO7-5: It makes me think my memory in the different period of experience, also about time.First, because the voice is saying about the memory, and the light effect brings me back sometime in my memory. There are many rings which make me feel they are standing in different stages in my timeline. I feel according to the moving of the light I come back to different locations in my memory.

P-GWO8-1: I feel lost in a black hole. The atmosphere of the installation lets me think about what the installation is conveying, but later I cannot figure out what the installation is conveying. Confusing.

P-GWO8-2: No.

P-GWO8-3: Sound is mysterious and also confusing. I feel I lost in the space.

P-GWO8-4: Images are pretty cool, especially ripples from near to far, but little simple, if there are other possibilities will be better. Images can be richer.

P-GWO8-5: It's cool stuff. It can be improved from software. I strongly want to make it more interactive, it can be richer. Maybe more body movements and gestures add more patterns from the movements, maybe other shapes. I do recommend to add more colors.

P-GWO9-1: First is calm down, makes me quiet, and curious about how the installation is setting up. I try to understand the patterns of the light and the sound.

After few minutes, I try to guess the motivation of the installation, but I didn't get the answer. I try to connect my previous life to this installation.

P-GWO9-2: I cannot influence the installation.

P-GWO9-3: Female words I cannot understand totally. The music is matching very well with the pattern of the light. It makes the atmosphere quiet and mysterious. But the sound of speaking words is wired.

P-GWO9-4: Images are the best part of this installation.But the movements are very smooth on the fabric, only on the fabric. I don't like the images on the ceiling. And I cannot understand the logic of the movements.

P-GWO9-5: It is more about art. It's kind of showing expression based on artist's own life experience. Bur for me I cannot get the point, but I really enjoy the atmosphere makes me quiet, calm down, makes me think about something.

P-GWO10-1: I don't get some strong emotions. In the beginning, I feel scared, especially when I hear someone is speaking to me. After that I notice the voice is part of the installation, no emotion then I just think the installation is beautiful.

P-GWO10-2: No, I cannot.

P-GWO10-3: I don't think it is beautiful, it is very technical sound, just special sound. I think the sound just matching the atmosphere of the installation.

P-GWO10-4: It is beautiful, especially when the visual effect is changing fast better than just a few lines effect.

P-GWO10-5: When I hear some voice, I feel she is waiting for me for a long time. I can feel some stories behind the installation, the feeling is very lonely, and it is waiting for someone. I also think the installation is about the lake and visual effects are like waves.

P-GWO11-1: I feel kind of loneliness in a positive way.

P-GWO11-2: Not really.

P-GWO11-3: Sound is easier to notice. It matches the visual effect. The background music helps to disconnect wth the world.

P-GWO11-4: Especially the falling ones look like stars. Then I notice there is more projection.

P-GWO11-5: My opinion is more about being involved in the installation. When you are standing in front of it, you feel more absorbed into the installation. But viewing from the side, that's more disconnected.

P-GWO12-1: First, I feel amazing. The lines are going through the body. Then I feel confused, I have no idea what's going on. Also, I feel sadder as time goes.

P-GWO12-2: I try to walk around I didn't see anything can be influenced.

P-GWO12-3: For the music, continues sad tone. I just was wondering what the female voice is talking and if I can leave a message on it. The I found it is in the loop, I am confused by that. Background music is also sad for me. Background music is matching the female voice. T he environment is dark, I really feel sad as time goes.

P-GWO12-4: I see loops, circles go here and there. It's a new way for me. I was just wondering what's the meaning of that loop. Some memories come up. I try to do few things, but I didn't feel any responses.

P-GWO12-5: This reminded me my experience. A girl was broken up with me.

P-GWO13-1: Most of all is curiosity. On the one hand, try to see what is going on, on the other hand, try to see how people made it.

P-GWO13-2: Not really, there is no interactive thing.

P-GWO13-3: I really like the music. It is really complimentary. The female voice is quite confusing because I could not understand.

P-GWO13-4: Really beautiful to see lines on the tunnel, waving motion like transforming from the static shape to something more interesting and more beautiful. When images are going forward, it really attracts my attention.

P-GWO13-5: Generally I am experiencing getting involved, but not making a conclusion what it is.

P-GWO14-1: Curiosity of the technology in the installation. I spend the first few minutes looking at all the elements.

P-GWO14-2: No.

P-GWO14-3: I like the sound. It is kind meditational. I didn't hear the female voice from the installation. It took me some time I didn't get it. It is mainly a sigh or part of the story. I would not know how it contributes to the certain experience.

P-GWO14-4: Because I walk around. From the side, I can see the beamer influences. But when I look inside the tunnel, like time traveling, time goes forward and backward, I can start to think. Images really contribute to the experience.

P-GWO14-5: If I have to give a purpose, it helps people to be lost and think, installation does it. I forget the world around.

P-GWO15-1: Memorable, and being lost. And I am curious.

P-GWO15-2: I feel something. I am not sure.

P-GWO15-3: I think that is the thing influences my experience most. When I enter the space, I hear the voice said you are so late, that reminders me my memory. The I feel curious what will be the next what's the story behind. I hear there are different kinds of music, but generally, they are sad cool for me and calm.

P-GWO15-4: I consider the light represents the relation between people and there are connections between two people.

P-GWO15-5: For me, it's like it is trying to visualize the story between two people, or between some relations. It's also like mixing of time and space.

P-GWO16-1: I become quiet, curiosity and calm. From the front of the tunnel, I feel it is very beautiful. It makes happy.

P-GWO16-2: At the beginning, I try something, but doesn't really react me.

P-GWO16-3: Female voice I don't know what she is saying. The background music sounds like machine or body orgasm, something is working.

P-GWO16-4: Sometimes it is smoothy and calm, sometimes it is messy. Circle structure makes images opposite each other. Images on the ceiling are contrasted to the images on the tunnel.

P-GWO16-5: I think it has to do something about the meditation. Effects it has make me calm during the experience. I try to focus on my breathing. It makes me forget the surrounding I am in. I don't know how many minutes passed. I had no feeling of time.

P-GWO17-1: When I firstly come to the installation, I feel really confused. I keep on walking around and listening to the sound. I want to know the whole meaning the installation wants to say. Make me empty later. I watch the light through the circle, it's amazing. I just watch, and forget the time and fall into thinking myself.

P-GWO17-2: I don't think there is interaction.

P-GWO17-3: At first, I am little scared by the sound, like the universe. When I listen to the girl's talking, I feel more scared then I am curious about why she is talking like that. After two or three minutes, I calm down and start to think about myself.

P-GWO17-4: I think it's quite fantastic when I saw in front of the tunnel. The wind is growing, images come to me, really like looking into a big eye. I think I am looking into someone's eye, or I am standing in front of someone's eye.

P-GWO17-5: Let me think about myself, think about the memories. It's a more personal device. I just feel I am in some kind of emotions. I am listening to some feelings around me. Let me feel personal isolated with the environment, connect me with the girl's feeling. I also think it is kind of universe.

P-GWO18-1: I feel scared, afterward, feel pretty, peaceful, comfortable and curious about what's about, what' there, and what I can do.

P-GWO18-2: I try to do something, try to find buttons and try to find the response, but there is no interaction.

P-GWO18-3: The music is kind of pop-rock. It is pretty nice, calm and peaceful. The female voice I can see what happened to her. I can see the emotion contrast between the background music and the female voice.

P-GWO18-4: Images are so beautiful. It reminders me the cell in the brain. The little dots on the installation are very beautiful and glorious. Images are really calm and peaceful.

P-GWO18-5: The installation maybe presents some kind of emotions, and let people experience the emotions.

P-GWO19-1: At first I feel scared, unsafe because of the darkness. I feel calmer for a while. I become relaxed to see how it works, but I still feel not very safe because of the sound.

P-GWO19-2: No, I don't think so.

P-GWO19-3: The sentences reminder me some memories. I start to be into that memory I had. Background music is kind of uncertainty. Somehow it can make me feel calm and peaceful. But voice and music sometimes still make me feel scared.

P-GWO19-4: The images are interesting there are different patterns. I start to observe the different patterns. I start to be abstract just watch the patterns.

P-GWO19-5: I think it's kind of about memories. Try to remind something in the unreal world.

P-GWO20-1: I think at the beginning, I am curious. And then I feel excited and happy after looking into it. When I look inside the tunnel that makes me happy.

P-GWO20-2: I guess not. I try to walk around but seems not.

P-GWO20-3: pretty interesting, most abstract things. Lady's voice makes feel lighter, I cannot comment more on it.

P-GWO20-4: I was wondering the light is shining from the outside. The end of the tunnel effect is really cool. I like it. When I keep closer to the tunnel, it's cool.

P-GWO20-5: I don't have any conclusion. I was also wondering I could not get it. Something about connection, like a machine tries to talk to you, reminders my computer is talking and communicating with me. But I don't have any conclusions.

P-GW[3]1-1[4]: Curiosity when entering the room. After a while, when getting a better overview, was attracted by the installation, absorbed by the installation. Feel more and more relaxed. This installation makes me forget the agenda.

P-GW1-2: No, I did not feel it. I just let the things over me. Experience without interaction is already stronger enough.

P-GW1-3: I like the sound, especially female voice.

P-GW1-4: Line projections are nice, like moving rings more.

P-GW1-5: This installation is visually pleasant. I just focus on installation, didn't try to connect the installation to other things. If I need to connect, should be outer space.

P-GW2-1: Curiosity. After a while, during visiting, feel peaceful and silent.

P-GW2-2: In the first few mins, I could not find ut the interaction. I try to touch, once I found the microphone, I felt maybe I need to interact with the microphone. But the interaction somehow confused at first, but finally, I figured out.

P-GW2-3: Sound is mysterious, different sound during the experience makes me feel lost.

P-GW2-4: Images are not regular, sometimes images are dramatic are more encourageable. When I looked through the tunnel, images motivated me to think about the peace, more related to man side.

P-GW2-5: Kind of bridge between the human voice and ocean. People can talk to ocean using your own voice.

P-GW3-1: slow down, calm down.

P-GW3-2: I feel installation is doing something with me.

P-GW3-3: Sound gives me the feeling of unhappy sound. But when you are in an angry situation, maybe the sound will make you calm, but for me, it's too calm.

P-GW3-4: I like the images, especially the wave at the tunnel. In front of the tunnel, you can see exactly what is happening. It takes the interest longer.

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3 P-GW: the participants in the group of condition 2 (with interactivity).
4 1-1: the answer of the first open-ended question from the first participant.

P-GW3-5: I think it was about the sea. Also, I am seeing something through the tunnel. And you I am wondering what is happening at the end of the tunnel.

P-GW4-1: First I feel scared. I don't know how to do is right. Therefore I feel confused. Later I feel it is very beautiful and amazing, because of the darkness.

P-GW4-2: No. I need to pay attention to the ground.

P-GW4-3: The sound also makes me scared. The information of the sound keeps away from the installation.

P-GW4-4: The lines come from different directions, I feel scared, and I could pay attention to the images especially when the sound appears.

P-GW4-5: It's about feeling. I think it's about sad feeling but also with hopefulness.

P-GW5-1: I am curious about how it works at the beginning, takes me some time to get used to the darkness. I don't know if I could walk around. Then I am pleasantly surprised to see the light. Also, a bit confused because I don't want to break anything.

P-GW5-2: Yes. I notice that if I stand in front of the tunnel, there is a different viewpoint, then I realize there is a microphone, I was a bit shy t react the installation.

P-GW5-3: Sound is very involving, and makes me feeling I am in somewhere special out of this world.

P-GW5-4: Images are beautiful, but I could not recognize anything, just beautiful to see the installation.

P-GW5-5: Involved. I think it's about communication between two people.

P-GW6-1: Excited. Curiosity. Confusing because of the darkness.

P-GW6-2: Not sure. Cannot explain.

P-GW6-3: Come out with nice and warm music.

P-GW6-4: Clear and presentable for the audience. First was wondering what it's for.

P-GW6-5: A tunnel with light. From an engineer perspective, like in the cinema, for art people, not for me, I was wondering what it's for. I don't know what it's for. For an engineer, I was wondering what's the size and material of the tunnel.

P-GW7-1: Calmness.Self-awareness of the place. Becoming more exciting when found the interaction. Calm at the same time I feel very active.

P-GW7-2: Realize standing in front of the installation, can making a sound to let

the light waves through space by breathing the microphone to see a light move out and move in.

P-GW7-3:   First feel like to talk to people, then realize it's recorded. Background music makes me calm.

P-GW7-4:   I like the images, make me feel I am looking into the outer space. I change the sound t o see the images if will change. Sometimes it will change, but it's not very visible. I care about the frequency of the sound if changes the images.

P-GW7-5:   Not sure, I would say it's about outer space or time traveling some kind of trip.

P-GW8-1:   Very attractive. Attract me to remember something about my childhood, the universe and outer space, especially experiences of nights, positive emotions, a mix of happiness and curiosity.Try to figure out what will happen next. The installation gives me the feeling I need to find out something.

P-GW8-2:   I notice that there is Kinect. I try to move my body.I realize it may have something, but I am not sure if its is managed or just by accident.

P-GW8-3:   Female voice is very attractive, background music can give me the feeling I should do something.Music is very attractive. The female voice makes me closer to the installation.

P-GW8-4: I just realize there are lines from different directions.   It reminds me something from the universe. I like it.

P-GW8-5:   From my first entering, it's attractive. It's attracting me to interact wth it. I don't know if it can change colors. I try to find out something more. It reminders me the firework festival in China. I like it, but if lines can change the colors and shapes, maybe will nicer to give people an even richer experience.

P-GW9-1:   First didn't get it. I walk to the side of the installation. Then I stand in front of the tunnel, not sure what is hanging up in front of me. The I see Kinect, I start to talk, nothing happens. Then I see the light breathing. Curiosity, pleasurable, assuming, relaxing and feel I understand it.

P-GW9-2:   Yes, feel a bit like dialogue. Smoking rings come from back, speaking rings go back.

P-GW9-3:   Nice, create an immersive atmosphere because more engage into space. I would not understand Chinese, confusing in a good way. Female voice should react more. When I am speaking, a female voice can be more talking or change the tone. If people talk too much, maybe female voice can be angry something should change.

P-GW9-4:   It's abstract, pleasable, and understandable.

P-GW9-5:   Interaction really feels like smoking rings. More like dynamic dialogues.

P-GW10-1:   First of all, curiosity and pleasure. I feel I am inside my own world just enjoy it.

P-GW10-2:   Yes, when I make a sound, I feel the art try to invite me to cooperate with it.

P-GW10-3:   At first, it was a bit scary, someone is whispering something. I feel I should also whisper in front of the microphone.Background sound is pleasant.

P-GW10-4:   I kind of seeing bubbles. Go inside the tunnel that why I keep breathing. I try to see what it will give.

P-GW10-5:   Sometimes I feel under the water inside the tunnel, blooming something and bubbles come. The female voice invites me to say something.

P-GW11-1:   Sometimes scary and sometimes calm. Curiosity to figure out what will happen. Feel connect my past.

P-GW11-2:   Yes, I would like to. I walk around, I explore, I do touch. I would like to explore more, like lying, and I am afraid of destroying the installation. But I would like t get more like smelling.

P-GW11-3:   I hear sound with a female voice speaking Chinese. I enjoy background sound with the female voice. I feel interact with the light but not the sound.

P-GW11-4:   Images firstly are very interesting. I try to explore which kind of patterns will show. I don't get the pattern deeply. Visually it's interesting and connects to my past.

P-GW11-5:   Integrate emotions, sparking my emotions. There are some interactions make me curious to do something. With sound and light, its really bring out my emotions. I do feel emotions. If I could be given more freedom, I think I can get different emotions and experiences. It is dark, after few minutes, adapting to the installation.

P-GW12-1:   I feel curiosity what the art is about. I see the light and tunnel, my emotion is interesting to turn technology into what I see.

P-GW12-2:   Not really. I feel there are some interactions. I see the speed of light changes, I also hear the voice. If it can be interacted with my gestures or movements, it will be more interesting. I didn't see the microphone at all at first, then I stand in front of the tunnel, I see the microphone and changes of light. I am not sure which kind of input I should do I cannot see the interaction pattern.

P-GW12-3:   Sound makes everything alive. Mix with the background music and

female voice is interesting.

P-GW12-4:   It's hard to explain. I saw in technical perspective, it is generous to project light into the wires. Light can go through the tunnel, technic is kind of good.

P-GW12-5:   The installation is trying to direct my feeling. If my gesture is slow, the sound is slow, when I knock the microphone, the light is changing, and sound also is changing. But interaction is also a bit confused.

P-GW13-1:   No very strong emotions. The strongest feeling is curiosity what the installation can interact with me.

P-GW13-2:   I think I do in certain extend. I can only influence it by voice, generalize by sound to influence the light. Feel like talking to someone on another side. But the reaction is very limited.

P-GW13-3:   Kind of recalling my memories, near a lake or about water, make me calm down.

P-GW13-4:   Images like trees from my memories and lake. All I can see are very familiar and very calm down. It's quite different to separate the experience, the female voice recall the memories as well.

P-GW13-5:   I think it's about trying to recall my memory - my own experience of going to the lake. I am immersed for two reasons: how man different feedbacks installation can give to me. I recall my memories and the similar scenery as the installation.

P-GW14-1:   First is I realize a lot of things during the experience. I saw the microphone, I talk to myself and the installation talks to me. Magnificant enjoying, fascinating to recognise patterns. Just enjoy it.

P-GW14-2:   Yes, being a musician without knowing. I experience the higher sound and lower sound clapping, talking and breathing, the nicest is the rings are continuing moving.

P-GW14-3:   Sound makes me curious. I am not the expert on music. At the same time, could makes me feel the feeling of a baby in the belly. Woman voice is appealing to me get in touch, then immediately feeling at home. The female voice feels safe and warm not stress at all.

P-GW14-4:   At first, I see the rings moving through the tunnel. After that, the rings will get softer and move to the back. Afterward, it would be the sea, waves of the sea. The light is not really warm, flashing. The feeling is calmer. I could not see more possibilities than I expect.

P-GW14-5:   Change my voice and the moving light.

P-GW15-1:   At the beginning, being surprised by what I see. I didn't expect. Really attractive.

P-GW15-2:   I couldn't see there is a microphone. The microphone is too invisible. Maybe people don't want to speak can just put the buttons to let people get the interactivity.

P-GW15-3:   I like the female voice, it's interesting. Background music reminds me in one movie there is silence, then something will happen.

P-GW15-4:   I like the way they passed. I call the visual effects, the light is passing over.

P-GW15-5:   Lighting installation. It could be an icon to show in the GLOW. Walking left is enough. The microphone needs to be more visible.

P-GW16-1:   At first I think I feel confused because of the light and sound. Sound sometimes is scared. Then I feel very calm.

P-GW16-2:   If color can be changed or images can be changed, the interaction can be richer, but the lines on the ceiling, disturbed the experience if looking inside the tunnel, it's attractive.

P-GW16-3:   In the dark space, it's quite scary, depending on the mood.

P-GW16-4:   I look the visual effect into the tunnel, it's calm. But looking at the ceiling, I become stressful.

P-GW16-5: Two things come to my mind: It's abstract. I think it is a lighting installation. You try to calm down yourself, and you try to free your mind.

P-GW17-1: I notice when the interaction happened, I feel calm. It starts to touch the memories, ripples connect, but it is something need a bit more time to get closer. If let the experience overtake you, you will really go inside.

P-GW17-2: In this case, it takes a while to influence it. In the beginning, I think I could not. But it's a nice experience to explore it.

P-GW17-3:   I didn't notice sound apparently, it just keeps me go inside the mood and atmosphere.

P-GW17-4: Images remind me light moving over the wires, lighting on the sea, like fish, try to move closer and move away. If you can see the end of the tunnel, experience then stops there. If the end of the tunnel can be blur. Maybe put the mirror on another side of the tunnel, or even put a mirror behind you.

P-GW17-5: I don't feel there is exact information. I do feel to forget the time and calm into the experience. I became more patient to the beautiful stuff, help me

create the moment with calm.

P-GW18-1: At first I feel the installation is quite attractive and beautiful. I try to find out it's something else. I am curious to walk around. I didn't find the key to interact then I find it connects to my voice. It reacts me with very light girl voice with beautiful light effects. I was moved. It reminders me the memories. Memory is flying through space. It reminds me the memories of my old friends.

P-GW18-2: Yes, when I say different things, I see different things. But I cannot see the rule it's a bit random.

P-GW18-3: Sound and voice are quite gentle. Sound likes the beach and the sea. Female voice reminders me my friend's voice.

P-GW18-4: Firstly I am quite amazing. I didn't interact with the installation. I saw the light. It's already quite cool. When I say something, it reacts me, I saw something changed.

P-GW18-5: I think it's about the memory. But the female voice said why you come so late and please don't leave. I make me think why I am here and makes me think why I don't spend time with my friends.

P-GW19-1: If I was in depressing feeling, I would feel sad or tears. I just had a good mood, I just feel pleasant to experience the installation. I feel like the installation looks like the eye of the god.

P-GW19-2: Yes, sure. There are some lighting effects when I stand in front of the microphone. I see the light going forward and backward.

P-GW19-3: I didn't pay a lot of attention. I just have a blurred memory of the sound. The sound makes me feel calm and peaceful. I am the person sensitive about the dark place, the music actually matches the environment.

P-GW19-4: I think I like it quite a lot, especially the moving circles. I like because of the material. But if there is no light on the ceiling, the experience will be better and also interaction gives me circles react to what I say. I am curious if, in the future, AI can involve in the installation.

P-GW19-5: It's a difficult question. Firstly it's an interactive installation. This one is not only an interactive installation but also feel like alive, not statics. Also, it's very huge, the huge thing always gives the safe feeling, gentle feeling. That's why I want to touch it.

SUMMARY

Drama, Story, Production, Interaction: A Design Approach towards Interactive Installations

Background: Since the early pioneers like Le Corbusier in collaboration with the Philips Corporation designed *Poème électronique* in 1958, practitioners including designers and artists have embraced interaction and interactive technologies as means for expressing their intuitive concepts. Consequently, designing the experience for interactive art products and installations has gained attraction worldwide over the last decades. Any innovative design is strongly influenced by the intent of the practitioner. Therefore, it is of utmost importance to understand how those practitioners' intent can be made explicit through their designed artifacts.

Objective: The main research question of this thesis is: how can practitioners design experience for interactive installations such that it relates their intent to their audience?

Approach: The long history of theatre and performance art has much to offer to the field of interaction design as Brenda Laurel noted as far back as 1992. Based on related literature and art/design practices, the analysis of and comparison between experience in performance and experience in interactive installations show that three relevant forms of negotiation exist: (1) how can the intent reach the audience; (2) how to bring the desired experience closer to the actual experience; and (3) how can interactivity play a role in installation-audience relationship. To investigate the design relevant

aspects of these three negotiations a new perspective on performance theory with the framework *Drama*, *Story*, *Production*, *Interaction* (DSPI) is taken. The DSPI framework is explored and developed through three practice-based design-research cycles. Cycle 1 allowed investigating how DSPI emerges its pattern in design practice. Cycle 2 concentrates on the effects when the DSPI framework is used as a linear process to guide the design practices. Cycle 3 describes the design challenge of a large-scale interactive installation project and the empirical evaluation with the audience. Each of the three cycles investigates how three relevant forms of negotiation can benefit from applying DSPI in a practical design process.

Methods: The three relevant forms of negotiation are addressed for their potential in influencing the degree to which the experience designed by the practitioners can reach the audience. The research questions are investigated through workshops with design students and practices of my own following different design processes. The designed artifacts as well as the quality of the design processes are empirically evaluated.

Results: The meaning and function of DSPI became clear and concrete from cycle to cycle. The component *Drama* can help to explicate the intent in the design process. *Drama* has four elements to be considered: theme, emotion, metaphor, and conflict. The component *Story* is more than just a description of the desired experience from the practitioner's *Drama*; "storying" is also the activity of developing the desired experience during the process. On the stage of the component *Production*, physical form and interactivity as the influential aspects are designed based on each other. The quality and completion of the *Production* is crucial to get the actual experience closer to the desired one. The component *Interaction* is the process of how the audience is encountering an interactive installation. The iterative approach to evaluate the *Interaction* enables the practitioners to see and adapt to unforeseen effects on the audience.

Conclusions: Showing through practices and empirical evaluations, this thesis provides evidence that DSPI helps practitioners go through three forms of negotiation in the process and achieve the design of a desired experience. The main contribution is to demonstrate how the experience in an interactive installation can be designed to reach the audience as intended. Therefore, the practitioners can utilize DSPI to advance their own design practice.

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CURRICULUM VITAE

Yu Zhang was born on June 29th, 1979. She received her Bachelor Degree of Arts at Nanjing University of the Arts in 2001, after which she worked at Nanjing Jiuchuang Marking System Company, a design company, as a project supervisor. From 2004 to 2006, she also worked as a lecturer in the Department of Design and Art at Nanjing Institute of Visual Arts. After she obtained her Master Degree of Arts at Nanjing University of Aeronautics and Astronautics in 2009, she was then employed as a lecturer at the College of Furniture and Industrial Design at Nanjing Forest University. In 2012, she was awarded the scholarship from the China Scholarship Council (CSC) and started her PhD research on interactive installations in the Department of Industrial Design at Eindhoven University of Technology.

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