



You are Here.

An Exploration into the Collective Effervescence of Awe
through the Design of an Interactive Installation

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Master thesis

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Abstract

It can be argued that we spend more time distracted than we do being present in the world. The phenomena of awe and collective effervescence can be hypothesized as a pathway to bringing us back into the present moment. By being absent from the present moment, we risk losing touch not only with ourselves, but also the world and the people around us.

Interactive installations may act as a medium for this phenomenon to arise. However, designing for awe and collective effervescence for interactive installations is limited. Using a Research through Design approach and a number of design experiments, we explored various design factors which we should consider when designing to facilitate this unique phenomenon.

The installation *You are Here* is an interactive installation developed and made to foster social connection and awe through collective effervescence. Through this, I identified the importance of bold feedback, collective play, convergent focused attention layers of curiosity and discovery and the facilitation of *the moment* in facilitating awe and collective effervescence.

We further discuss the importance of personal lived experiences and a phenomenological approach when starting an exploration from common everyday experiences and phenomenons. This paper provides a framework and serves as an example of how we as researchers and designers could incorporate awe and collective effervescence within the context of interactive installations.

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“The world isnt only on the palm of your hands, we’re exploring space! There are so many opportunities”

- Muhardi Muhiman, my grandfather.

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Chapter 1: Introduction

Are you here? Are you really here, in the present moment? We live in a world where we are too busy in our heads and forget about our bodies. It does not only make us disconnected from ourselves but also from the people around us. Yet, I can argue that there are moments where we are not in our heads, rather embodied in the world. Moments where we are so immersed in the world it's as if time stood still. It's the emotion of awe.

This thesis starts from a design intuition, which is the idea that the emotion of awe might provide a way for us to capture our attention towards the present moment. There's something unique about experiencing awe together. Think about the last time you shared a moment of amazement with your loved ones or even a group of strangers. These collective moments of awe or collective effervescence, not only make us more embodied in the world but it also connects us to one another through a language more powerful than words.

Over the past decade we have seen the rise of interactive installations. These installations could act as a medium for people to experience these moments of collective awe. Yet how can we as designers design for experiences which could facilitate awe and collective effervescence? As the studies focusing on this are limited in numbers. Through a Research through Design approach, this is an exploration of the experience of awe and when experienced collectively, can be a pathway for us to become more embodied in the real world while also increasing our sense of connection to the people around us.

Are you really here?

The setting is a retirement home for the elderly. Wilfred enters the veranda in search of two close friends. He is in luck, they are both present. But alas, one is lost to her Walkman, and the other is engrossed in his book. Neither notices Wilfred's presence. Frustrated, Wilfred is left to stare silently into space. Such is the beginning of Ronald Harwood's London play, Quartet. Young or old, we instantly identify with the scene. How often do we enter a room to find family, friends or colleagues absorbed by their computer screen, television, CDs, telephone, newspaper, or even a book? Perhaps they welcome us without hesitation; but sometimes there is a pause, accompanied even by a look of slight irritation. And at times our presence may go completely unacknowledged. We are present but simultaneously rendered absent; we have been erased by an absent presence.

Extracted from Gergen, 2002

How often are we actually present in the world? When was the last time we actually enjoyed a cup of coffee, fully paying our total attention and senses towards the experience? Often, I would argue we spend more time in our heads or distracted (absorbed in our gadgets or lost in our thoughts) than we do in the real world; further making us lose touch with ourselves and the community around us. We could be having dinner with our family, yet our minds wander to that task we needed to do for work. We could be with our friends yet our attention focus shifts to our phones, never engaging in the world. We could be experiencing a beautiful sunset yet we decide to capture the moment with our cameras, instead of capturing it with our presence. In the end, it really comes down to one thing:

We are rarely ever present.

Lost in the moment.

We all know that feeling. That feeling when we watch a beautiful movie, or the feeling that we get when we see a beautiful sunset. We all know the feeling however it is very difficult to fully describe the emotion of awe. It is the experience when we truly feel immersed and the experience and we are lost for words. As Dacher Keltner (2023) puts it, awe is the emotion we experience when we encounter vast mysteries that we don't understand. It is that feeling when your entire attention goes into the moment, and you feel as if nothing else matters in the world except for this current moment. You are just there, simply observing, or doing. Your full awareness is focused on what's right in front of you; you are simply lost in the moment. However, something unique happens when we experience this emotion of awe together.

Collective Moments of Awe

To truly describe this feeling of being *lost in the moment*, and especially when experiencing this together, I want to share a short story from my own personal lived experience that might express this sacred phenomenon.

When I was back home in Indonesia I went to one of the malls I used to visit since I was a little boy. Inside, was a beautiful large clock that would open up every hour, revealing six doll figures which would strum their mechanical hands to the beat of a dream-like melody. This clock had been standing longer than I had been alive. Even after all these years, I am still in awe at the timeless beauty that it is. And as I am watching, I can also see others watching too, fully immersed; whether adults, children, or even the people who are working; for a short moment in time, many people stop just to enjoy this short yet nostalgically beautiful spectacle.



Figure 1.1. Marygold Clock Installation in Plaza Senayan, Jakarta Indonesia

I saw how an art installation was able to stop people from what they were doing and simply immerse them in an experience. Even if it was just simply for three minutes, I could clearly see and feel a certain emotion which I cannot explain as people watched the art piece move, and dance even if I knew that art piece had been there since I was a young child. To me it is fascinating to be able to see how often people can be caught up in their own worlds, however, an art piece can simply bring them back into the moment and experience the present, even just for a few minutes.

There is something about this phenomenon, in which people observe collective moments of awe that strikes me. Everyone is devoting their attention towards a common focus, collectively engaging in a moment together. It is about the fact that people not only experience a beautiful moment of awe alone, but also share it with the people they love, or even simply strangers. And for reasons beyond words, these shared moments make us feel connected to one another. These collective moments make us feel like we are not alone in this world. It gathers and connects people together.

Lately, I have noticed more of these artistic expressions and technologies appear in the form of immersive spaces and interactive experiences. Experiences we often find in festivals or museums such as Touch by Daan Roosengaarde, Autonomous Abstractions by TeamLabs, or The Pool by Jen Lewin Studio:

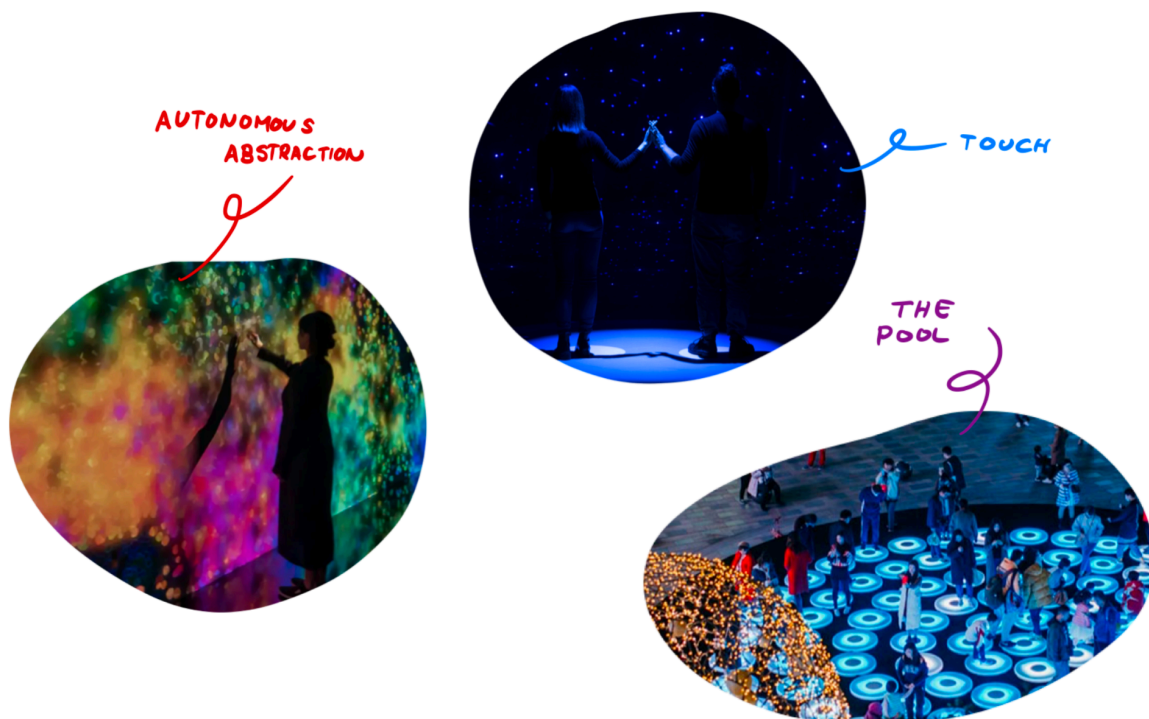


Figure 1.2. Examples of Interactive Installations (adapted from respective websites)

These installations allow you not only interact with the space, but also with each other. And the people, from what I observed, seem to be immersed in the experience, focusing their attention purely on the experience; these experiences that offer these collective moments of awe. Could it be that these experiences act as a medium for connecting us to each other once again? Could it be that interactive experiences like these offer a way for us to become more embodied in the world? Douglas Rushkoff (2023) speaks about this idea in one of his podcasts, he believes that it is through these ecstatic experiences that we can bring people back into their bodies and protect the *real world*. Experiences which “help people experience deep social connection, get them making eye contact again, touching, going in water, walking barefoot...” (Rushkoff, 2023), to bring them back into the present moment through this experience of collective awe.

In this research I aim to explore this phenomenon and try to understand how we as designers can better design installations which could facilitate these collective moments of awe. This research will be an exploration into the beautiful phenomenon of awe and how we can design for it through collective experiences.

Chapter 2: Theories

Before diving into the exploration of what the phenomenon is and how to design for it, I would like to first introduce a set of theories and concepts which help ground the phenomenon and understand it from a scientific perspective. A majority of the text written in this Chapter 2 (excluding the section: collective effervescence) was adapted from my research topics (Bayuaji, 2023; See Appendix D: Online Repository). Here, I will introduce four different theories of Embodied Technology, Awe, Collective Effervescence, Mindfulness. I will conclude with how these theories play a role together within the context of the phenomenon being explored.

Embodied Technology

As Krishnamurti puts it, when the mind starts from a theory and works on it, it may collect plenty of experience, but it will not experience reality.

- Krishnamurti: *The man and his teaching*

Over the years there has been an increase in interest in embodied interaction and how it can be implemented through research and design. The terms embodied or embodiment could be seen as vague and fragmented throughout different research, further creating unclarity as to whether embodied interaction could be seen as one concept or many perspectives (Duarte et al., 2022; Marshall et al., 2013). Within this paper, I will use the terms embodied and embodiment interchangeably.

Embodiment has different meanings within the different disciplines. It is therefore crucial to understand what embodiment means and how we will refer to it throughout this exploration. Referencing the phenomenologist Merleau-Ponty, Van Dijk put it as: “To take an embodied perspective means to reject any cartesian reduction of [a] human being into a ‘physical body’ on the one hand and a ‘mind’ on the other. It is a unified lived body, not a physical body or the ‘mind’, which anchors our most basic being-in-the-world” (Merleau-Ponty, 1962; Van Dijk, 2018). Here, we can define embodiment as being present within the world, both mind and body; fully focused on interacting with the lived world. Think of a football player as he juggles the ball with his feet; both body and mind are simply focused on the action. This further entails that an embodied individual is fully focused and immersing themselves within the interaction with the world. Both body and mind are in sync with the task at hand; interacting as one.

The concept of embodied interaction was first introduced by Paul Dourish (2001) who suggested that it is a perspective that explores the relationship between people and artifacts. Dourish argues that the conventional approach used in HCI design fails to take into account embodiment. He suggests that computations are not just digital representations of data, instead, they are mediums for which meaning could arise from different levels when users

interact with the system. More so, unlike the contrary belief, it is the users who create this meaning, not the designers. Furthermore, Dourish suggests that embodied technologies or artifacts are part of the world they represent rather than simple external representations, which further helps turn a user's actions into meaningful interactions with the system (Dourish, 2001).

Jelle van Dijk and Caroline Hummels (2017) builds upon Dourish's philosophy further suggesting: "*Embodied theories may help designers in understanding how in the concrete interaction between a person and a technological artifact, the 'material' and 'immaterial' aspect are really part of one 'lived' experience*". This further entails that the interaction between a person and artifact takes place in the physical real-world while also being done in a physical manner. Van Dijk and Hummels (2017) expound on the fact that embodied interaction aims to bridge the 'mind' and the 'physical body'; further iterating on the work of Merleau-Ponty; by designing artifacts that act as an alternative to body-mind cartesian split philosophy.

There are multiple ways in which embodiment could then be implemented within design. Starting off, we could take a look at van Dijk and Hummels' (2015) theory of embodied sensemaking in which they argue the act of sensemaking; understanding and making sense of a subject, situation, or environment, is an embodied act. It is through interacting with the world that we can make sense of the different information provided to us. We can build upon this with De Jaegher & Di Paolo's (2007) theory of participatory sensemaking in which they suggest that sense-making is not only an embodied act but also a social one. As they suggest, information is not only available in the mind, however it is also distributed within the environment and other actors around us.

It is through our environment and social interactions that we have the opportunity to better understand the processes, and information provided to us, further allowing us to make sense of the world around us. As they state: participatory sensemaking is "the coordination of intentional activity in interaction, whereby individual sense-making processes are affected and new domains of social sense-making can be generated that were not available to each individual on her own" (De Jaegher & Di Paolo, 2007). These theories point out the importance of social human interaction within the embodied world, as a starting point for designers to create interventions.

Jelle van Dijk and Caroline Hummels (2017) proposed one possible design method for embodiment entitled *Designing for the embodied being-in-the-world*; In which designers would take daily human interactions as a starting point and identify how design interventions could play a role in enhancing these daily interactions while simultaneously nudging humans to be more in the world. In this framework, they propose 7 different principles for Designing for embodied being-in-the-world:

1. Sustaining skills → Tools are mediators for our body to perform skillful actions. Artifacts or tools designed must support, enhance, and sustain these bodily skills.
2. Social coordination → Actions have a social context: we create meaning together with others by interacting with physical objects in the world
3. Embedding in the lifeworld → Objects exist within the lifeworld(or the world we live in) and are socio-situated
4. Forming and expressing identity → Skills and tools build the identity of an individual
5. Social relationships → Through skills, tools, and activities, people can build social relationships within the community of practice
6. Transforming the Lifeworld → The long-term use of artifacts has the potential to develop over time through skills that result in the transformation of people and possibly culture
7. Reflecting in- and on action → Through the artifact, we can reflect through the ongoing activity rather than only before. This entails that the artifact is a medium that allows for reflection while taking action.

Adapted from Van Dijk & Hummels, 2017

These theories on embodiment and embodied technology guides designers and researchers to design for being embodied and present in the world. Furthermore, we can also take a look at how the emotion of awe could also act as a pathway for us to become more present in the world.

Awe

The most beautiful thing we can experience is the mysterious.

It is the source of all true art and science.

- Albert Einstein

It is a challenge to define the true meaning of awe and even more difficult to measure. It is an emotion that has continued to catch the attention of researchers over the past few decades for both its beauty and complexity (Keltner & Haidt, 2003; Sharma & Kabra, 2021). Whether it is from witnessing the view from the top of a mountain peak, or simply seeing a beautifully complex painting, humans have experienced the complex state of awe. Kelter and Haidt (2003) suggest that awe has two main *elements*; the perceived vastness and the need for accommodation. Perceived vastness refers to an experience that is vast or different from the normal range of experience (of the user). This could either be vast perceptually or physically. An example of a vast perceptual experience is watching an extraordinary display of skills and thinking to yourself: “*Wow! How did they do that?*”, while something perceptually vast could be as if you were looking at the beauty of the Niagara Falls. The second element, the need for accommodation, refers to the desire for the user to further adjust their mental structures to fully understand and process the experience at hand. Both elements are important for an individual to experience awe. Simply said, awe is an emotion we feel when we encounter an experience that is different from our regular set of experiences, which requires us to adapt our mental model to process the experience fully.

Kelter and Haidt then continue to suggest that there are multiple *flavors* of awe. These could be divided into 5 different categories. First, *Threat-based Awe* which is evoked by danger and threatening experiences. Second, *Beauty-based Awe* which is through aesthetically pleasing experiences. Third, *Ability-based Awe* is when an individual has the opportunity to view or witness extraordinary talent or skill. Fourth, *Virtue-based Awe* is when people view a person acting selflessly. And fifth, *Supernatural causality* which is experiences that relate to a higher power and spirituality. Irrelative to the different *flavors*, the experience of awe has multiple benefits for the individual which include an increase in the overall wellbeing of an individual while also elevating their prosocial behavior (Monroy & Keltner, 2022).

As complex as the emotion of awe is, it can even be more complex to design for. It remains a widely unexplored topic within the field of design (Marcus & Wang, 2019). This then further creates challenges for designers who want to evoke awe through their designs (Ke & Yoon, 2020). This leads to the question of how designers can evoke awe through the artifacts they create; more specifically, how can designs create and design interactive installations which have the power to evoke awe. In their work, Ke and Yoon (2020) proposed that there are six different design strategies that could be used to evoke awe within human product interactions.

1. *Ephemerality of beauty: Evoking awe through designs that are beautiful and aesthetics*
2. *Timelessness: Evoking awe through designing classic and timeless artifacts*
3. *Presence of a Higher Power: Designing powerful artifacts by creating the notion that the artifact is bigger*
4. *Novelty with overwhelmingly high complexity: Evoking awe through designs that are complex and difficult for the user to conceptually understand*
5. *Rapid changes and unpredictable behavior: Evoking awe through ever-changing design, either by designing an unpredictable system or a system in which the user doesn't have "full control" or autonomy over the design interaction.*
6. *Active participation in a collective: "...the design's direct interaction with multiple people or the representation of many people creates a sense of vastness because they are surrounded by a sea of people or their visual representation."
"[Creating a] design that invites and allows multiple to participate in its usage simultaneously by incorporating multiple affordances that indicate collective use"*

Adapted from Ke & Yoon, 2020

Ke and Yoon's work was built upon Desmet and Roeser's (2015) concepts on emotions in human-product interaction. In the work of Desmet and Roeser, they proposed that there are three main ways emotions could be evoked within an interaction. Their theory could be divided into three main components; (1) initial perception, (2) interaction, and (3) social perception. Firstly emotions could be evoked when the user sees or perceives the technology, this entails that the user initially sees or first comes in contact with the technology without any means of interaction. secondly, emotions can be evoked when the user interacts with the technology whether it is through gesturing, manipulating, etc some sort of emotion is invoked as the user utilizes or interacts with the artifact. The last way an emotion could be evoked between a user and a product is through the social implication of the artifact. An artifact could evoke emotion in the user when they are either perceiving, or interacting with the artifact, or the artifact, and the user could evoke emotions within those around the two (Desmet & Roeser, 2015).

Collective Effervescence

Once the individuals are gathered together, a sort of electricity is generated from their closeness and that quickly launches them to an extraordinary height of exaltation

- Emile Durkheim (1995 [1912])

The emotion of awe can then be evoked through social interaction in a form of collective awe.¹ This brings us to the concept of collective effervescence, a sacred phenomenon which occurs when groups of people gather and share a common activity, focus, or emotion. In this subsection I would like to introduce the concept of collective effervescence. First coined by the phenomenological sociologist Emile Durkheim, collective effervescence is described as a phenomenon where “When engaged in social activities, the individual mind could be quieted and a sense of sacredness, ecstasy, and well being developed. It is that sense of sacredness that makes submersion in the group so enjoyable” (Gabriel et al., 2020).

Collective effervescence was first described as an experience which emerges from taking part in sacred moments and activities; Think of a time where you took part or witnessed a religious ritual, such as praying together with others. Or imagine being in a stadium and being moved by the crowd as they cheer for their favorite football team and their sense of selves disappears as they scream at the top of our lungs, feeling unified with others around us. “Through moving in unison and convergence in feeling, a transformation in consciousness occurs: we shift from an egocentric view, seeing the world through our eyes only, to a shared attention to what is transpiring” (Keltner, 2023). Yet we can also find collective effervescence in these simple and mundane moments in our everyday lives. Think of a time where you and your family shared a prayer or a toast before you had a meal. Or playing in a band who is improvising together seemingly in the flow with your other musicians. Think about that time you clapped together with strangers as you watched an amazing performance. These shared experiences form a sort of ritual which moves us to a heightened emotional state and connects us with others.

Randal Collins (2004) describes our day-to-day interactions with others as a form of interaction ritual (IR). “A theory of interaction ritual (IR) and interaction ritual chains is above all a theory of situations. It is a theory of momentary encounters among human bodies charged up with emotions and consciousness because they have gone through chains of previous encounters” (Collins, 2004). It begins with symbolic objects or actions which creates a shared focus of attention amongst those involved, “transforming individuals into ritual participants and transforming the atmosphere as a result” (Collins, 2004; Hill et al., 2022).

¹ *The concept of collective effervescence was discovered in the process of the current design. However, I would still like to introduce this theory as a guide for the readers. I will return to this concept starting from the second iteration in which I will begin to describe how this concept influenced my design process and my understanding of the phenomenon.*

According to Collins (2004), an interaction ritual provides an avenue for collective effervescence to arise. Interaction rituals have four ingredients which includes group assembly (bodily co-presence), barrier to outsiders, mutual focus of attention, and shared mood. Furthermore the successful emergence of collective effervescence through an interaction ritual could produce four main outcomes: group solidarity, emotional energy in individuals, symbols of social relationship (sacred objects) and standards of morality.

Ingredients of IR	Description
Group Assembly (bodily co-presence)	Two or more people are physically assembled in the same place, so that they affect each other by their bodily presence, whether it is in the foreground of their conscious attention or not
Barrier to outsiders	There are boundaries to outsiders so that participants have a sense of who is taking part and who is excluded
Mutual focus of attention	People focus their attention upon a common object or activity, and by communicating this focus to each other become mutually aware of each other's focus of attention
Shared mood	They share a common mood or emotional experience

Outcomes of IR	Description
Group solidarity	A feeling of membership
Emotional energy in individual	Emotional energy [EE] in the individual: a feeling of confidence, elation, strength, enthusiasm, and initiative in taking action
Symbols of social relationship (sacred objects)	Symbols that represent the group emblems or other representations (visual icons, words, gestures) that members feel are associated with themselves collectively
Standards of morality	Feelings of morality: the sense of rightness in adhering to the group, respecting its symbols, and defending both against transgressors.

Table 2.1. & 2.2 Ingredients and Outcomes of Interaction Rituals; Adapted from: Collins (2004)

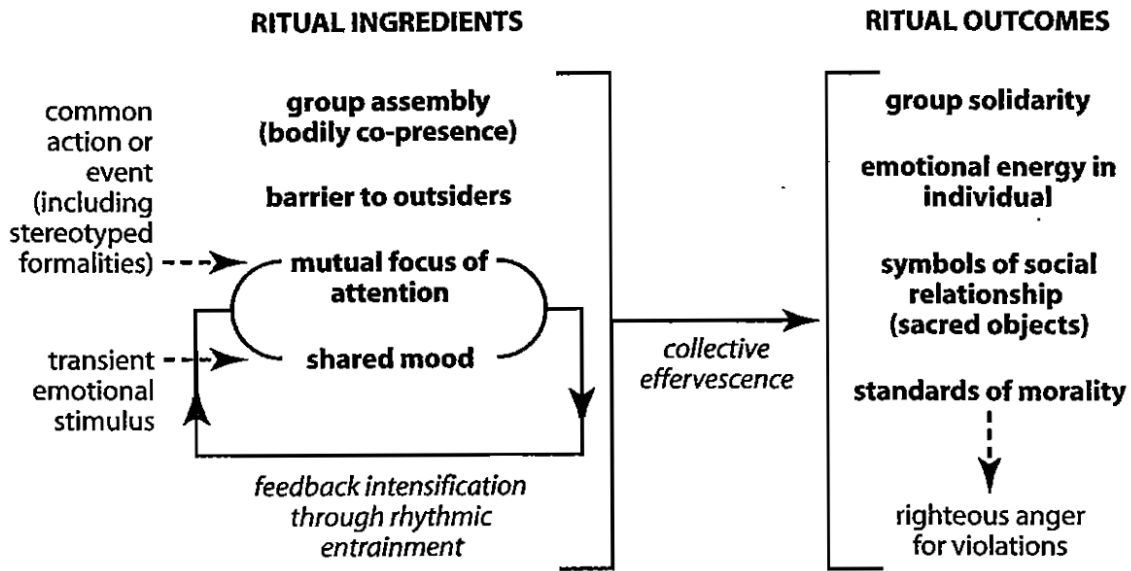


Figure 2.1. Interaction Ritual Model; Adapted from: Collins (2004)

Collective effervescence is a beautiful phenomenon which emerges through the shared movements, attention and emotions which happens during these interaction rituals we share with others around us.

Mindfulness

The really alive person is a here now person. He does not live out of the past, he does not live for the future, he lives only in the moment, for the moment. The moment is all.
Osho, Creativity

As we critiqued, we live in a world where we operate from the mind, one could argue we live more in our heads than we do in real life. How do we move into the moment and become present with everything around us? One possible answer to that question is mindfulness. The topic of mindfulness continues to catch the interest of HCI researchers, with the number of publications related to mindfulness continuously growing over the past years (Terzimehić et al., 2019). How can we define mindfulness within the context of awe and embodiment? We can define mindfulness as a state of being totally present in the current moment; to be-in-the-world both mind and body.

Based on this definition alone, one could assume that mindfulness encompasses what has been discussed in regard to the emotion of awe and also the notions of being-in-the-world in regard to embodiment. This is further supported by Kerr et al (2013), who suggest that mindfulness starts from the body itself, and as the body is an important consideration within the field of embodiment, mindfulness could be viewed as a core aspect of understanding embodied interactions; as bodily experiences are crucial in the field of embodied interaction.

We can clearly see that the concepts of awe and embodiment could be closely linked to the concept of mindfulness. However, it will be clarified that the focus of this study is not to achieve a state of mindfulness for individuals, rather, this paper will only focus on how awe and embodiment are interlinked. Mindfulness in itself is not the goal of this research however, it could be that it comes as a by-product of the interaction and the phenomenon which is discussed. Furthermore, the field of mindfulness has been thoroughly explored within the context of design in comparison to the designing for awe which is relatively novel and still remains a complex emotion to design for.

Furthermore, Terzimehić et al., (2019) highlight the possible irony of how it is the technology itself that potentially creates a sense of mindlessness within ourselves, thus prompting the question of whether more technology is needed to make us as individuals more mindful. Take the example of a phone, which started as a communication tool, and is now seen to have negative effects on individuals due to its excessive and unnecessary use (Kim et al., 2018). It could be argued that it is the technology itself that acted as a scaffold for this mindless behavior. In an era where technology is prevalent in our daily lives, do we also need technology to act as a scaffold to bring ourselves back into the real world? This furthermore raises the

concern of our dependency on technology. In this research, we fully acknowledge this as a consideration that needs to be pondered upon during the progression of this study.

Combining the theories.

In the previous sections, we have discussed the concept of awe, mindfulness, collective effervescence, and embodied technology. Here, we will see how these concepts relate to each other and to the phenomenon being explored². To begin, it could be argued that awe and embodied technology are two ways in which an individual could become more in-the-world. Awe and embodied technology then are not goals, rather they could be considered *pathways* for which an individual could become present in the world. As previously discussed, awe is an experience and emotion felt by individuals when they experience or interact with something in the lifeworld that they perceive as vast and requires the need for accommodation.

This in itself is a form of interaction between the individual and the physical world. We can relate this to the concepts brought in embodiment in which interactions that are embodied happen in the physical world. This could then suggest that it is through interaction within the physical world that the experience and emotion of awe can be evoked. However, this raises the question of how engaged do people need to be in order for awe to be evoked? Or do we need to be immersed in a space, in which an ideal setting is crafted for awe to be evoked?

More so, based on what has been discussed, awe has mostly been presented as a passive experience. An emotion that is evoked through viewing a phenomenon, experience, or artifact within the world. Here, the word passive in this context refers to the individual being presented with the experience (ie. the individual views something and feels awe because of it).

This then contradicts the whole notion of embodied sensemaking which pushes forward the notion that individuals make sense of the world through interaction. In this case, we can define interaction as the physical gestures, manipulation, and engagement between the individual and the artifact (in this case, the artifact that evokes a sense of awe). Is awe then an active or passive experience? Can the act of interaction then also be considered an important aspect of evoking awe? To obtain more insight into these questions, we can refer back to the six methods to evoke awe by Ke & Yoon.

Looking closely at the methods presented by Ke & Yoon (2020), only two out of the six proposed methods to evoke awe could be suggested to involve active participation with the audience. In this sense, active participation involves the individual physically interacting with

² The concept of collective effervescence is not included in this preliminary framework as it was found during the research. We will discuss how collective effervescence fits into this framework after the design iterations, in the discussions of this paper.

the artifact which could then result in evoking awe. Thus it could be suggested that these six methods could be further subdivided into two sections; passive and active. Here, we refer to any interaction between the individual and the artifact to be a form of active experience. In contrast, a form of work or artifact that presents you with the experience (the individual sees the artifact) is considered a passive experience.

Strategy	Ephemerality of beauty	Timelessness	Hierarchy & presence of higher power	Novelty & complexity	Rapid and unpredictable behavior	Active participation in a collective
						
Source of emotion	Perceiving the design and its association with passage of time	Perceiving the design and its association with passage of time	Social implication of the design on one's social identity	Perceiving the material qualities of the design	Perceiving the material qualities of the design	Activities enabled by using the design
Awe appraisal	"I may never experience again this special once-in-a-lifetime moment."	"I perceive the design to withstand human lifetime, and persist beyond my own lifetime."	"I see the design as powerful and greatly exceeding my human capacity"	"I cannot quantify or explain the overwhelming complexity of this."	"I cannot control or predict, nor do I need to control what it will do next."	"I feel as if I am part of a larger community as one in a sea of many others."

Figure 2.2. Six Strategies to design for Awe, adapted from Ke & Yoon (2020)

Passive strategies to evoke awe	Active Strategies to evoke awe
Ephemerality of beauty	Rapid and unpredictable behavior
Timelessness	Active participation in a collective
Hierarchy & presence of higher power	
Novelty and Complexity	

Table 2.3. Division of active and passive strategies to evoke awe adapted from Ke & Yoon, 2020

Another common denominator that could further support the idea of passive and active awe is the concept of shared experiences. As previously presented, awe could be evoked through collective and shared activities. Activities such as dance, religious rituals, or what we can call collective movements are said to have the power to evoke the emotion of awe (Monroy & Keltner, 2022). Within the context of this paper, we will call these forms of activities: *shared experiences*. Ke & Yoon's (2020) work on interactive installations and awe further supports this idea, when they state that awe could be evoked through "*active participation in a collective*", in which collective participation could create "a sense of vastness ... [which makes] ... the user realizes that she/he is not alone, but rather a part of a much larger community or group, and this shift in perspective induces a need for accommodation" (2020). The concept of collective participation could be linked to the concept of participatory sensemaking (De Jaeger & Di Paolo, 2007), which pushes the notion that individuals together, make sense of the world

through interacting with artifacts in the world. More so, this could be further supported by van Dijk and Hummels' (2017) framework of Design for embodied being in the world by suggesting that it is through interaction with other individuals and the world that we build meaning.

This association between collective participation, and participatory sensemaking & social coordination could be the missing link in understanding how awe could be viewed as an active experience while also suggesting that awe could emerge from activity, rather than only perception. Here we can then suggest that awe could be seen not only as an embodied but also as a social phenomenon; In which individuals could together, through shared experiences, evoke a sense of awe through collective forms of movements and loop of activities. The idea of collective participation further suggests the notion that awe could be embodied but also social. Thus this paper argues that awe could be experienced collectively; the awe that could be experienced through collective and social interactions.

These theories provide us an insight to how this phenomenon arises. However at the end of the day, they are simply theories. To truly understand this experience we are trying to explore, we must first go back to the phenomenon in of itself. There are indeed various interactive experiences that we can argue acts as a medium for this phenomena to occur.

Chapter 3: Interactive Experiences as a pathway to being-in-the-world

In this chapter we will explore the different examples of interactive installations already present in the world which seem to offer an experience (close to or) related to awe. Similar to the previous chapter, these installations were identified during my previous research into this topic. The works, initial insights, and preliminary framework sections found within this Chapter 3 of the thesis were adapted from my previous research topic assignment (Bayuaji, 2023).

Given the nature of this exploration and its focus on interactive installations, not all the projects are associated with a scientific organization or documented in research papers. Often, these installations express themselves in the form of artistic expressions, which are rarely documented in the form of a scientific research paper. This meant that an alternative way of researching for these installations is required. To identify these installations, I utilized a snowballing technique through open research on Instagram, websites, and blogs in combination with interactive installations found in research papers within the TEI database. Here I will list a total of 11 interactive installations found during my research topics, which I believe are closely related or have the possibility to evoke awe and related to the phenomenon I am exploring. Through the following examples, we can gather inspiration for possible technology uses for interaction, feedback, context, and social connection.

Touch by Daan Roosegaarde

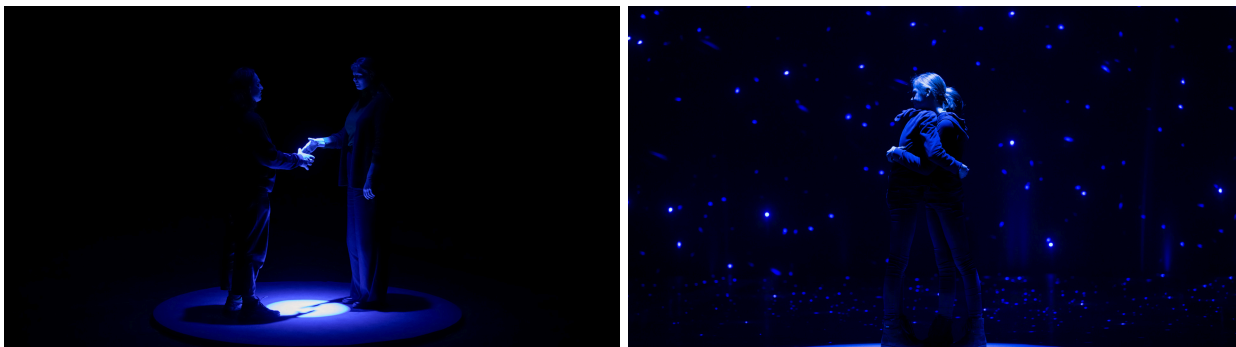


Figure 3.1. & 3.2. *Touch* by Daan Roosegaarde

Touch is an interactive installation designed by Daan Roosegaarde which highlights the importance of physical touch; specifically the physical touch and connection shared between two individuals. Whether it is a simple touch, handshake, or embrace the installation *Touch* highlights “... that even the smallest shared interaction can have a big effect and change the world around us. It makes us feel how important it is to be part of a community...” (Studio Roosegaarde, 2021). The installation starts as a dark room in which two individuals can move

to the center of the room. However, the two individuals are physically apart. As two individuals touch physically, the room instantly becomes a room filled with stars symbolizing human connection between the two individuals. The installation utilizes electronic sensors to detect physical touch between two individuals. The final output comes in the form of lights which are displayed in an installation space that measures approximately 4300m cube (T. Studio Roosegaarde, 2021).

Lightwaves by Pan Generator



Figure 3.3. & 3.4. Lightwaves by Pan Generator

Lightwaves is an interactive light installation initially designed for a music festival in Poland. The installation consists of 15 interactive drums on which people can drum on. Their actions then trigger light waves which collectively create an audio-visual experience through a large helium-filled sphere display. The installation focused on collective participation amongst people through a synchronized activity of *drumming*. Pan Generator aimed at “creating interactive art experience in which the audience can actively participate in the event rather than just passively enjoy the music, gathering and playing together” (panGenerator, 2019). The installation utilized custom-made sensors for the drums which is influenced by the speed and intensity in which the users interact with the drums. These interactions are then mapped to addressable LEDs and also a projection on the sphere.

Inner Life by Maotik



Figure 3.5 & 3.6 Inner Life by Maotik

“*Inner Life* is an interactive installation that reacts to the movement of the public” (Sourd, 2022). The installation which consists of a space in which people can walk on top dynamically reacts with the individual movements of the people. As people move throughout the space, direct feedback can be seen in the visual composition below them. Maotik focused on abstract watercolor visuals and sounds that change as the user moves throughout the space. More so, this composition is continuously being processed, thus creating a unique interaction or feedback every single time.

More so, as Maotik states, the installation “...explores human movement practice to facilitate movement expression and communication, and to design and develop new paradigms for interacting with computers through movement” (Sourd, 2022). In terms of technology, it is only stated that Maotik utilized laser touch interactivity. This could imply lasers, motion detection sensors such as laser, LiDAR, etcetera. Although little information can be found in terms of the technical makeup of the installation an intuitive guess could be made that the installation utilized projection mapping which reacts to the movement of the individuals.

Autonomous Abstraction by teamLab

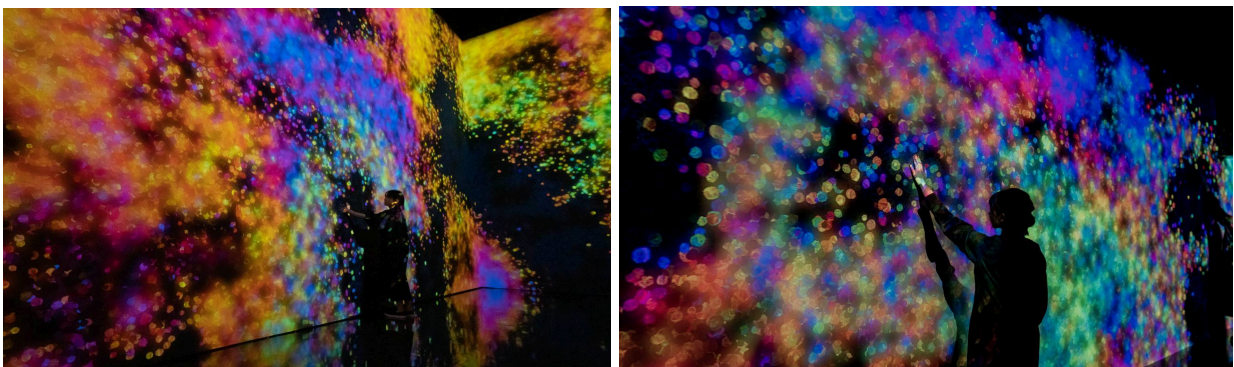


Figure 3.7. & 3.8. Autonomous Abstraction by teamLab

Autonomous Abstraction, Continuous Phenomena from the Universe to the Self is an interactive space designed by the interactive media studio teamLab. It is a visual-auditory experience in which people can view but also interact. The installation symbolizes the,

“...spontaneous order phenomenon occurs when different rhythms influence each other and synchronize. Examples include when the pendulums of two clocks gradually begin to swing together; when many fireflies gather in one tree and all start blinking at the same time, creating a larger light as a whole; or when the cells that make up the heart synchronize and tremble simultaneously to create the pulse of the heart.”

In this installation, users enter a space filled with dynamic dots of light that continuously blink and change colors. More so, “The dots of lights emit a tone each time they blink. The tones can be heard continuously throughout the space; what sounds like music is solely created by the continuous tones produced by the blinking lights.” (teamLab, 2022). The visual aspect of the installation is projected onto the walls of the installation space. As individuals move closer and physically interact with the wall, the dots change colors while also radiating away from the point of touch.

Similar to the previous artifact discussed, little information could be found in regard to the technical hardware and software utilized in this installation. It could be intuitively deduced that similar to the *Inner Life* installation, *Autonomous Abstraction* utilizes projection mapping to visualize the rendered videos onto the walls of the exhibition space while also utilizing a form of laser tracking technology to detect the movement and touch of the individuals.

I am the Sun by Volna



Figure 3.9. & 3.10. I am the Sun by Volna

I am the Sun is an educational art project that revolves around the topic of creating an art installation utilizing renewable energy sources. Powered by solar panels, the installation

consisted of 72 individual light modules which were displayed in front of a bus stop in the TUMO Center for Creative Technologies in Yerevan, Armenia.

“There is a Japanese proverb that “whoever finds himself is like the sun.”... When looking at the installation from a distance, the viewer sees their reflection on a mirrored surface, but as they move closer an unexpected flash of light appears, evoking an emotional response.” (VOLNA, 2022).

This installation could also accommodate multiple users at one time, allowing users to interact with the installation either alone or together with multiple people; providing space for an open ended exploration. More so, the users could move their hands to interact with the installation, stand, or walk in front of the different light modules.

Sync by Daan Roosegaarde sync



Figure 3.11. & 3.12. Sync by Daan Roosegaarde

In collaboration with BMWi, Daan Roosegaarde highlights the aspect of human connectivity through the installation *Sync*. *Sync* is an interactive installation that detects the movements of individuals within a space. The installation highlights the importance of social interaction and personal space. As a person walks through the art space, contour laser lines will form around their feet; representing their personal space. However, as multiple users start coming in close proximity with each other, these contour lines begin to merge; symbolizing the connection between the two users. As stated: “With more people the artwork creates shared spaces of light, making new interactive connections between people” (Studio Roosegaarde, 2019). Unfortunately, no technical details were included in the documentation of *Sync*, a similar deduction could be made to *Inner Life* by Maotik, in which it could intuitively deduct that projection mapping of visuals and a form of movement detection was used to form the interactivity of the installation.

Creatures by Iregular

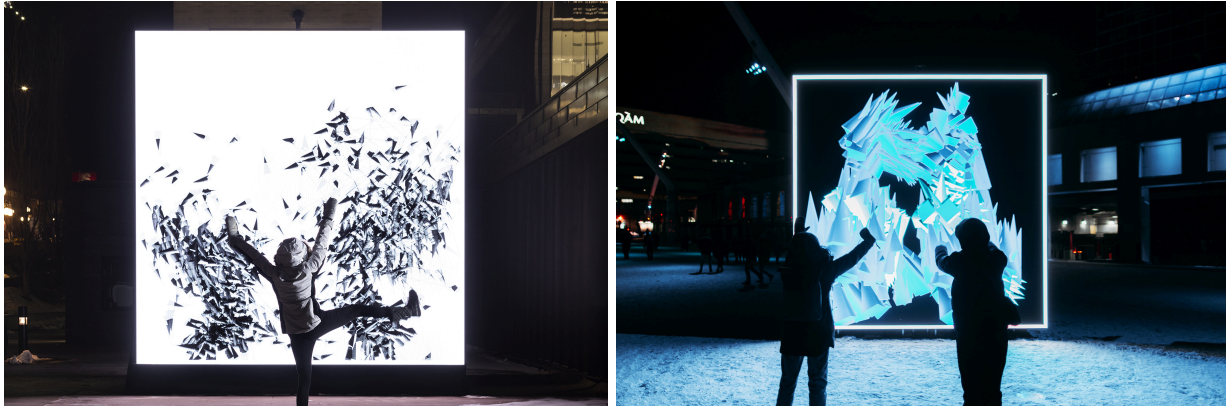


Figure 3.13. & 3.14. *Creatures* by Iregular

A symbol for human interference with the animal kingdom, *Creatures* is an interactive installation that displays a flock of abstract-shaped birds and fishes that naturally move throughout the physical display. However, as users come closer to the installation, the movements of the flock get disrupted as users begin to move their bodies. The collective Iregular highlights the often thought to be destructive relationship humans have with animals. The installation consists of a one-sided lightbox which is substantially larger than the average person. This size allows for a larger visualization and image to be seen while also allowing multiple users to interact with the installation at once (Iregular, 2021).

Pixels by Jonas Vorwerk



Figure 3.15. & 3.16. *Pixels* by Jonas Vorwerk

Pixels and *The Pool* were both identified within the paper *Flowing Bodies: Exploring the Micro and Macro Scales of Bodily Interactions with Urban Media Installations* (Afonso et al., 2019). The interactive installation *Pixels* was designed and made by the Dutch artist Jonas Vorwerk which consisted of multiple LED plastic cubes that light up in different colors. The installation

made use of LED lights, Arduino, accelerometers, infrared sensors, and radio frequencies in order to create each individual cube. Each time the cube is rotated onto one of its sides, the color of the cube changes. Within a set physical space, the set of playful blocks provides an opportunity for both individuals and groups to express their creativity. Pixels is an example of an installation which fosters both an aspect of open ended play and social connection. As stated: “The pixel blocks are a tool that triggers both individual expression and collective exploration. Both are an integral element of the artwork that becomes complete through the multiple transient interactions with the public” (Vorwerk, 2011).

The Pool by Jen Lewin Studio



Figure 3.17. & 3.18. *The Pool* by Jen Lewin Studio

The Pool by Jen Lewin Studio was the second installation found in the paper *Flowing Bodies: Exploring the Micro and Macro Scales of Bodily Interactions with Urban Media Installations* (Afonso et al., 2019). *The Pool* is an interactive installation consisting of a circular area filled with large circles which is activated by user interaction. Each individual *module* can be activated once a pressure is detected (intuitive deduction) as a person steps on them, as a user steps, the color of the circle will begin to change and fade away when no one steps on it. This installation invites groups of people to take part in an open-ended experience that allows them to participate “in an ever-changing composition” (Jen Lewin Studio, 2008). *The Pool* is an example of an installation which invites individuals into the interaction by being physically present and open ended play while building upon the continuous honeypot effect.

Jing Hua by Jifei Ou

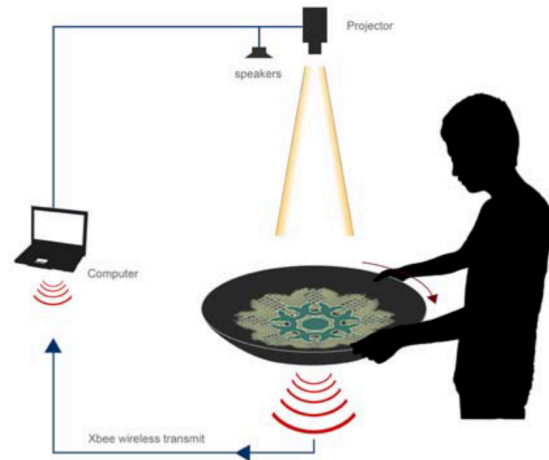


Figure 3.19. & 3.20. *Jing Hua* by Jifei Ou

In the paper *Jing Hua: Interacting with Virtual Flowers in A Physical Garden*, Jifei Ou explores the intersection between subjective aesthetics through the interactive installation *Jing Hua*. *Jing Hua* utilizes two main components. A white bowl equipped with Xbee module and an accelerometer(1) and a projector, computer, and speaker set-up which is hung from a birdhouse on a tree and projects down onto the moving bowl (2). The project projects a visualization of a flower onto the bowl which could be manipulated as the user interacts with the white bowl. Users can simply shake, toss, move, or do different forms of body movements on the bowl to alter the visualization of the flower. More so, multiple people could come together to hold and play with the bowl together further changing the visualization of the flower, inviting people towards open-endedly playing together with each other. The installation “gives an artistic example of how to merge natural and computational aesthetics by performing a tangible action” (Ou, 2012).

Wish Happiness by Kristina Mah et al.



Figure 3.21. & 3.22. *Wish Happiness* by Kristina Mah et al.

In the paper *Designing With Ritual Interaction: A Novel Approach to Compassion Cultivation Through a Buddhist-Inspired Interactive Artwork*, the artwork *Wish Happiness* was presented. The artwork is an interactive light artwork that was heavily inspired by Tibetan Buddhism and was aimed at cultivating and evoking a sense of compassion amongst users. The artifact was designed in the shape of a pagoda with a circular base which formed a moving circular carousel in which users can spin. More so a projector was utilized from the top of the pagoda to display a visualization of a mandala (kaleidoscope) on the floor of the pagoda. As users spin the carousel, the visualization changes becoming more dynamic and clear; a symbol of creation and destruction. Every so often, a bell which is located on the top of the pagoda will ring. A reference to Tibetan tradition which often marks the beginning and the end of a meditative practice or mantra. Here it is seen that the installation was intentionally designed for collective use and activity. *Wish Happiness* is an interactive installation that focuses on the concept of rituals to evoke compassion through a collective activity for individuals of all ages (Mah et al., 2020).

Initial Design Insight

From these various works, we can draw a number of initial design insights to help us further understand (1) what has already been done, and (2) how these installations fit in regards to the phenomenon I am exploring. Taking a look at the examples above, it can be seen that all the artifacts were able to be utilized by multiple individuals. Each artifact was able to accommodate interactions with more than one user simultaneously. However, although the artifact was able to accommodate more than one user, it might not have been a conscious design choice to make it so. Further suggesting that it was not an intended design choice but through emergent behavior, a social context appeared.

It can be clearly seen where the installation *can* be used by multiple people in comparison to those installations which were designed *for* multiple people. Here we can take the example of *I am the Sun*, where each module of the installation contained its own sensor which could detect interaction. This allows for more than one individual to interact with the installation at any given time, however, it does not have the capability to differentiate between one user and another. The opposite could be said for installations with multiple users was a predefined design choice made. A clear example of this could be the *Lightwaves* in which dedicated drum pads were provided indicating a clear affordance that the installation expected multiple users in order for it to function. This highlights an important design consideration: the intention that it is designed for multiple people.

It could be seen that the various installations utilized various ways in order to design for multiple interactions. Looking back at *Lightwaves*, the installation made use of collective

drumming in order to create a more lively audio-visual experience, as more users take part in the interaction, the audiovisual experience lives up. On the contrary, some installations provide scaffolds for individuals to work together or to notice connections between different users and the artifact. Take the example of *The Pool* and how it expresses the opportunity to provide open-ended collective play for the people, or how *Pixels* allows for both individual and collective expression; with no specific goal. Taking a look at *Sync* in which the field lines between two people merge as they begin to get closer together, the installation does not focus on a collective expression nor a collective goal, rather the installation focuses on highlighting the connection between users. The same approach could be said regarding *Touch* in which physical contact between two individuals sparks the interaction of the artifact.

These three approaches suggest that social coordination and participation could be achieved in three forms of interaction. (1) Collective goal; working towards a common goal through the installation (eg. *Lightwaves*), (2) Collective expression; no specific goal however the multiple users interaction creates a cohesive social expression (eg. *Pixels*) and (3) emphasis for human connection (eg. *Touch*); the interaction between two users is highlighted through the artifact. These suggest that social coordination and participation within interactive installations could fall under these three approaches.

In regards to technical components, there were 5 installations that focused on utilizing digital modalities such as screens and projects to project visuals while the remaining six artifacts involved and utilized physical artifacts that could be manipulated. We can categorize the artifacts into three main divisions. Interactive media, physical artifacts, and physical interactive media. Interactive media refers to digital videos, animations, and renders which could be interacted with by the users; such as the installations *Creatures*, and *Inner Life*. Physical artifacts allow for physical manipulation and exist in the real world; two examples include *The Pool* and *Pixels*. Lastly, Physical interactive media combines both physical and digital elements that the users can interact with; some examples include *Jing Hua* and *Lightwaves*.

From the insights we gathered, we can also categorize the installations to either evoke passive or an active experience of awe in which awe is either evoked as the user is presented with the experience (passive) or it is evoked through their interaction (active). To describe this, let's look specifically at the five installations of *Inner Life*, *Autonomous Abstraction*, *Touch*, *Lightwaves*, and *The Pool*. Out of these five installations, *Lightwaves*, *The Pool*, *Touch* places an emphasis within the interaction. Here, the experience is created through the interaction between the individual with the installation and the people around them; creating an active experience of awe.

In comparison, the installation *Inner Life* and *Autonomous Abstractions* mainly presents the user with the experience and user interaction is limited; creating a passive experience of awe

as the experience of awe would mainly come from perception rather than action. Taking a closer look, between the installations, the installations which were previously described as active experiences utilized a form of tangible interaction or medium, while the installations with passive experience mainly utilized interactive media. Here it can be deduced that to create an active experience of awe, we should take into consideration the use of tangible interfaces while also considering the importance of the user's role within the interaction.

Based on these 11 installations, we were able to extract a number of different initial design insights which include (1) the intentional design choice to accommodate multiple users in the interaction, (2) forms of social connection within installations, (3) the difference between active and passive experiences of awe within the installations. It could be argued that the installations themselves were not designed specifically to evoke awe (or if it was successful in evoking it); nor did the designers mention that they were specifically designed for awe. However, these initial design insights could give us clues on how we as designers design for these collective moments of awe.

Preliminary Framework

Combining the theories and reflecting on the works in the sections above, I can identify a number of key design components and create a preliminary framework to guide us through the research. We can distinguish these awe into two main categories. A passive experience; in which the user is presented with an artifact which they perceive with awe. Or an active experience; in which awe emerges through the interaction between the artifact and the user. We can recall Desmet and Roeser's theory on emotions in human-product interaction. As they suggested, there are three main ways emotions could be evoked through human-product interaction. Through perception, interaction, and social implication. In relation to awe and embodiment, it could be argued that embodied technologies exist in the second stage (interaction), while awe primarily exists through perspective (the first stage). Thus it is suggested that in order to incorporate awe and embodiment into the model, these three parts need to be further expanded.

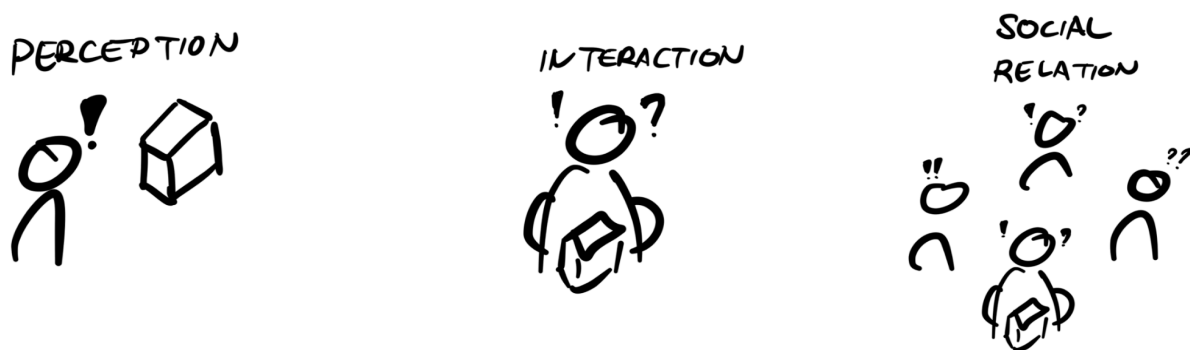


Figure 3.23. Three ways emotions can be evoked through products.

Adapted from Desmet & Roeser, 2015

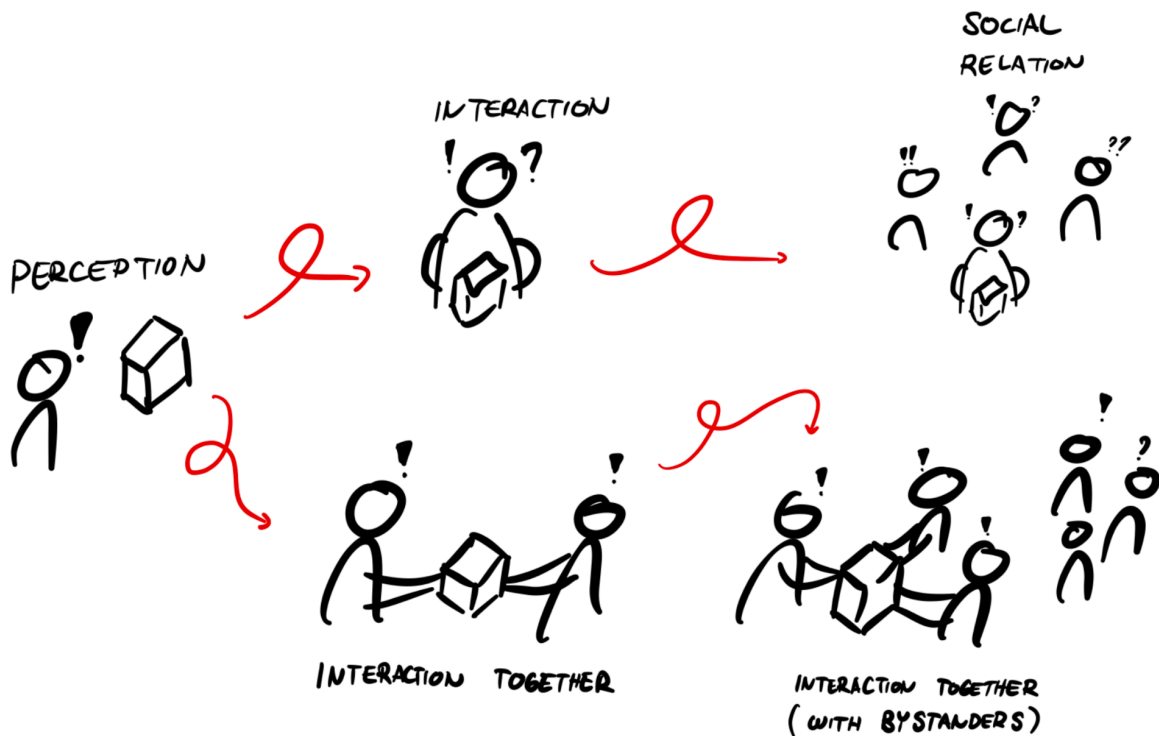


Figure 3.24. A further elaborated model to accommodate social aspects of the interaction.

In the elaborated model, a social component was added to interaction and social perception. Firstly it could be suggested that awe could be evoked through individual interaction with the artifact where the use of various scaffolds could help make sense of their interaction (Hummels & Van Dijk, 2015); evoking the emotion of awe through the user's interaction.

However, awe could also be evoked through collective movement and social interaction. Here I emphasize how it is also through interaction with other individuals mediated through the installation that has the potential to evoke awe. The act of collective interaction between multiple users becomes a form of participatory sensemaking as the users make sense of their interaction as a group (De Jaegher & Di Paolo, 2007). This could be how awe becomes a collective and also an active experience.

In the third component (ie. social implication), it could be suggested that it is not only the individuals involved which experience awe, but awe could also be experienced by the bystanders who view the interaction between the active users and the artifact. This could also then suggest that social implication is similar to initial perception. In which bystanders are simply individuals who perceive the interaction of the user and artifact, which then evokes a sense of awe.

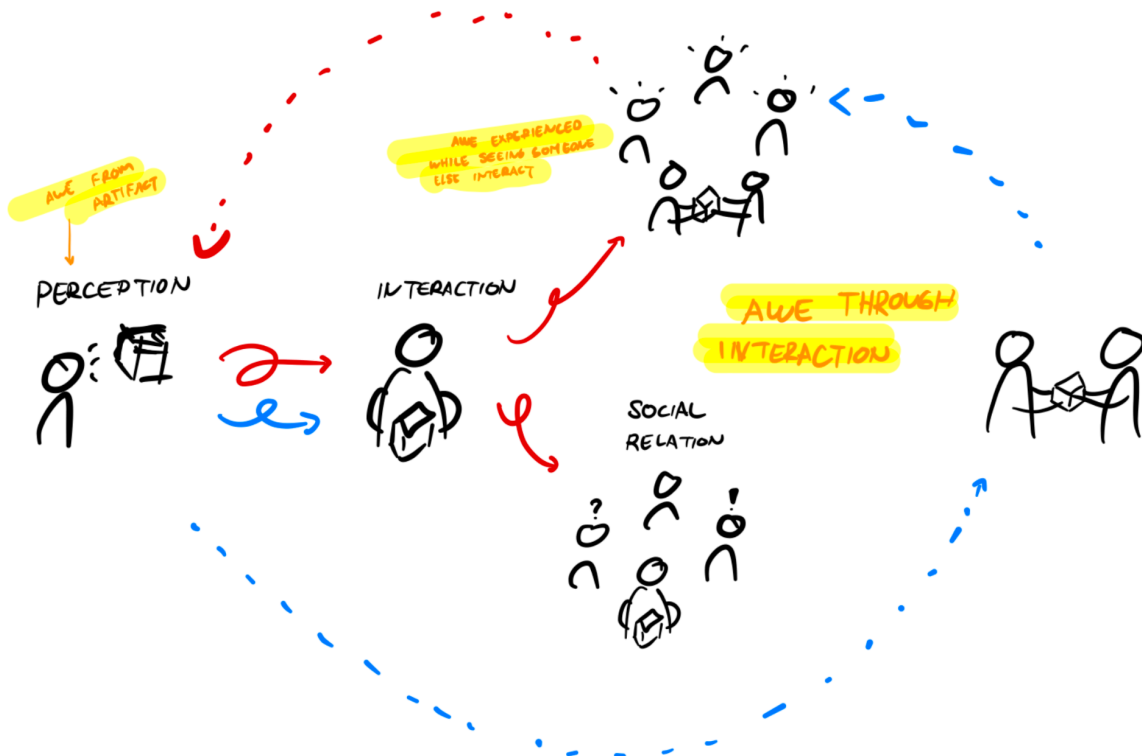


Figure 3.25. Ongoing feedback loop within user-product interaction

This suggests that there is an ongoing feedback loop that happens during the interaction. As people begin to notice the artifact, they could potentially interact with it together, potentially evoking a sense of awe. As this interaction is perceived socially by bystanders, it could motivate others to also take part in the interaction, thus creating a feedback loop; this phenomenon could be described in HCI as the *Honeypot Effect* (Wouters et al., 2016). In this framework, we will not focus on perception, rather we will focus on the latter aspects, primarily the social interaction component. Based on this, we can ask the question of how awe can be considered both an active but also a collective experience that emerges from a loop of physical activity while further questioning how the notion of interactive installations could support this interaction. This preliminary framework will serve as a starting point to understanding how we as designers and researchers can design for this collective experience of awe.

Design Direction

Moving forward in this research I want to move away from screen based installations such as *Autonomous Abstraction*, *Creatures*, and *Inner Life* because I argue that they can be considered disembodied and can be seen as a form of passive experience; where the user is *presented* with the experience rather than playing a major role through the interaction. I want to

take inspiration from *Jing Hua* and *Wish Happiness* mainly through the fact that they are tangible interfaces which promote the sense of collaboration amongst the bystanders. *The Pool* and *Pixels* can be grouped into one category of interactive installations which are publicly situated and foster the Honeypot effect. *Autonomous Abstraction*, *Creatures*, and *Inner Life* can also be grouped into one category of installations which are mainly screen (visual) based and minimal user involvement is needed.

In this research I want to make people interact more with the real world by promoting a sense of embodied sensemaking (Hummels & Van Dijk, 2015) by focusing on other senses rather than just their visual, while also grounding the individual back into the world. To do this, I would need physical artifacts which can act as both a scaffold and medium for users to interact. Furthermore, as the social aspect is key in the phenomenon I am exploring, placing user to user interaction at the core of my design process to further stimulate participatory sense making (De Jaegher & Di Paolo, 2007). I will make the conscious design decision to design for people to experience together and make sense of the experience through physical movements and tangible interfaces. I believe these two components are crucial to this research as they provide the first clues to how the phenomenon of collective moments of awe is experienced and could be designed for.

Research question and Design Challenge

From the previous study, I developed an initial framework to structure my design process while narrowing down which design components I would like to bring forward, however the question still remains: is there such a thing as a collective experience of awe? If there is, how can we design for it? In this study, I aim to explore this phenomenon of collective awe and how we can design for it through interactive installations. The main goal of this exploration is to identify key design features which designers could utilize to design through awe for interactive installations. To understand how we as designers can design for this collective experience of awe, the main research question and design challenge at the start of this exploration is as follows: *How can embodiment promote social interaction and a sense of awe through interactive installations?*

This question encapsulates two aspects: social interaction (or social component) and how awe can be evoked within and through the social interaction. This research is a first exploration of how we as designers can design for this phenomenon and create more embodied experiences to help facilitate more presence and embodiment within the world. It is an exploration which aims to inspire through presenting a design which acts as an example of how we can design for the collective experience of awe. While also providing a preliminary design methodology which people can explore and further build upon. And as any other design discipline, there are no hard clear definitive answers (ie. no design *laws* in terms of how to design for something, rather we have design guidelines and theories), I simply aim to build upon existing works while striving to understand how we can create design guidelines as I (and future designers and researchers) continue to explore this field.

Furthermore, the nature of this question is malleable. It is an adaptable question at the start of this research-through-design project, where what to design for and how to re-articulate the problem is part of the process. As iterations progressed, the research question will evolve based on my understanding of the problem and the topic being addressed.

Chapter 4: Methodology

To explore the complex phenomenon and further understand how we as designers could design for it, I devised a research plan accompanied by various methods of data collection. Within this research, I will be implementing a Research through Design methodology. Research through Design (RtD) is described as “an *approach* to doing research that could lead to *theory for design*”. Here researchers focus on a designers’ way of approaching various phenomena which are often complex and unclear. Through this approach, knowledge will be generated mainly through the making and evaluating of a resulting artifact which has been iterated throughout the research process (Zimmerman et al., 2010).

Within the context of this research, I am to use research through design as the main methodology to explore the various concepts and main phenomena. By utilizing various prototypes and an iterative process, I aim to explore and deepen my understanding about what factors are needed to facilitate the emergence of collective effervescence and awe. As this study is an exploration, it will use a wide range of methods to collect various quantitative data regarding the theories and phenomena being explored. Given the numerous sub-experiments and explorations which will be conducted, this section will provide an overarching view of the methodology of the entire research. Detailed methods for each section (ie. co-creation, prototyping, user research) will be discussed in each iteration itself of this paper.

Structure and Timeline of Exploration

The iterative structure of the research is divided into different phases which includes: Iteration 1—Designing for Awe, Iteration 2—Designing for Social Connection, and Iteration 3—Designing for Collective Effervescence. The other components of the research which includes the co-creation sessions, awe experience mapping workshop, and user evaluation study will be inserted in key moments within the three sections. In the following subsections, I will briefly describe each design and research experiment which will be utilized within the iterations.

Iteration of prototype

The development of each prototype begins with a conceptualization that utilizes several different techniques. These techniques include brainstorming methods such as brain drawing and mind mapping either alone or together with other designers through the co-creations that take place. In total, three iterations or concepts of a prototype will be developed.

Co-creation Session

As mentioned in the previous section, the study will make use of two co-creation sessions which will mark the end of the first and second iteration of the prototypes. Co-creation is a

process where we involve multiple stakeholders and individuals into the design process. Here we will focus on the mutual learning which emerges amongst the various participants, building upon everyone's understanding revolving the concepts being addressed. (Luck, 2018). This process of co-creation and codesign fosters the collective creativity to tackle the complex problems of the present day (Sanders & Stappers, 2008).

The role of these co-creation sessions is threefold. First, explore the current state of the prototype. Second, to scaffold and brainstorm together in order to build upon the prototype, and third, to conduct a deep dive to explore the phenomenon of awe by documenting individual awe experiences and extracting design choices for awe in interactive installations. These sessions will be held with a group of four to eight designers; each with their own respective expertise to take a designer's perspective on how we can design through awe within the context of interactive installations.

Within the context of this exploration, the co-creation sessions would provide various insights towards the concepts of awe and collective effervescence by exploring the theories revolving around these concepts and relating them to the personal lived experience of each individual. These meaningful insights could then be implemented into physical prototypes.

Awe Experience mapping

Between the first and second co-creation, a diary exercise will be conducted with the same participants of the co-creation. The goal of this diary exercise is to have the participants document their own experiences of awe which they experience in their day-to-day lives.

The awe experience mapping is a form of diary study where the participants will be asked to log diary entries whenever they encounter the emotion of awe. Taking the considerations found in the study: *A Qualitative Approach to Guide Choices for Designing a Diary Study*, a number of considerations were made, such as utilizing short form questionnaires, and the use of smartphones (in the case of this study, a group chat) as a electronic diary to increase the feasibility of the exercise for the participants (Janssens et al., 2018). However, unlike in other studies which utilizes a beeper (a tool or action which notifies the participant to take a moment to write an entry), the participants would be asked and reminded to do so through a group chat and it is on the initiative of the individual of when they feel the emotion of awe; as everyone's personal experience of awe could be subjective.

The goal of this awe experience mapping aids the research in two different ways. First, it provides insight to where and when awe is experienced in everyday life, providing real-life examples and further providing different contexts. Next, it provides the opportunity to identify emergent themes which would arise from the different behaviors.

Use research

Each iteration includes the completion of a prototype along with a form of use evaluation. In the case of Iteration one and two, this will be conducted together with the participants of the co-creation session. For iteration three, this will be conducted with new participants. The use research will be conducted as the conclusion of the third iteration and will serve as the final observation and evaluation of the current artifact, replacing the co-creation session which marked the end of the iterations. New individuals will experience the prototype, in comparison to the focus group of the cocreations; to provide fresh perspectives and explore whether novel, unexpected interactions will emerge. The main goal of this use research is to (1) determine how the prototype designed could evoke awe through social interaction, and (2) identify possible design choices to facilitate the phenomenon being explored.

Structure of Iterations

A visual representation of the entire process can be seen below:

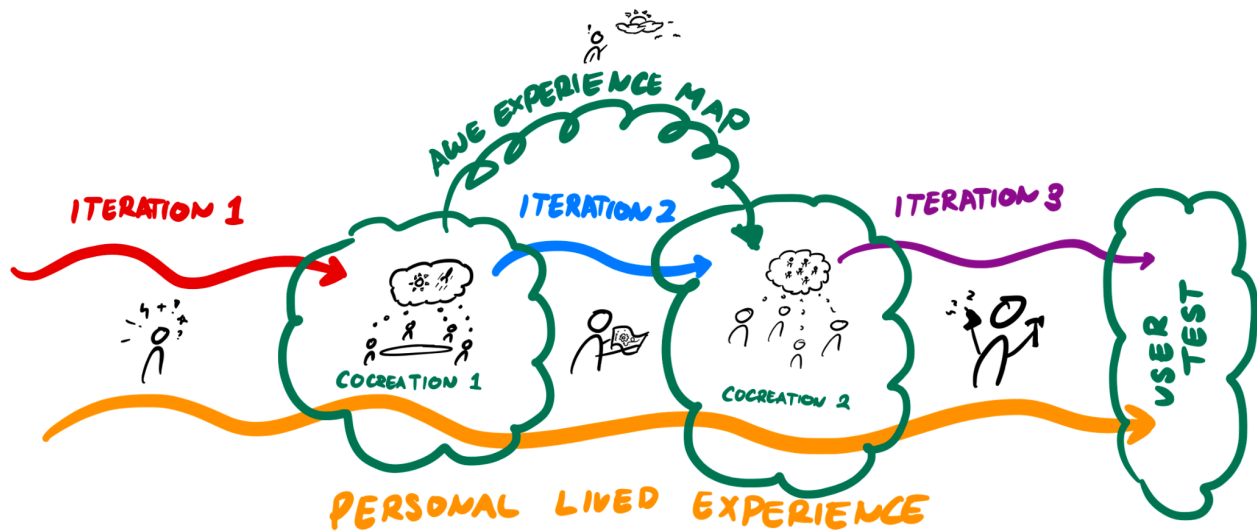


Figure 4.1. Visual Representation of research methodology

Given the iterative process of the design, the results will be renamed to Iterations and will be divided into three sections to accommodate each iteration; Iteration 1, Iteration 2, and Iteration 3. This structure aims to aid the reader in chronological order in understanding the design choices and the effects of compounding results on the progress and evolution of the research question, design, theories, and finally the prototype that has been developed. Each iteration has the following basic structure:

Subsection	Details
Reframing of Research Question	Redefining the research question to better understand the phenomenon based on the results of the current iteration.
Design and Concept	Discuss the initial ideation and conceptualization of the prototype and how it came to be
Prototyping	Breaks down the current prototype in terms of hardware, software, design, etc
Co-creation Session	The co-creation will serve as the conclusion for iteration 1 and 2. This section will describe the methodology, rundown, and results of the co-creation.
Awe Experience Mapping* (<i>only iteration 2</i>)	<i>Present results of the awe experience mapping</i>
Use Evaluations* (<i>Only in iteration 3</i>)	Present and discuss results of the final use evaluation of the study
Intermediate Reflection	This section aims to synthesize findings from the prototype, cocreations, and also personal lived experiences. Providing key insights to how we can better design for the phenomenon

Table 4.1. Details of each interaction subsection

Prototyping Utilities

Throughout the process of the various iterations, multiple software and applications will be used. The list of utilized prototyping softwares is as follows:

Software	Description
TouchDesigner	TouchDesigner is a node based programming language commonly used for multimedia projects. It provides a medium for multiple inputs and outputs to be connected together with its high interoperability, connecting various software together.

Ableton	Ableton is a digital audio workspace used for music and sound production. With its Live features, Ableton allows users to produce and do live sound generation, allowing for the possibility for generative soundscapes and live performances.
Arduino IDE	Written in C++ the Arduino IDE serves as the main software application to program microcontrollers such as the Arduinos and the ESP 32s.
Max MSP	Max MSP is a node based programming language specifically made to experiment with audio and music. It also offers high interoperability which allows it to receive data from Serial and output Midi information straight into Ableton.

Table 4.2. Technical Prototyping Tools with details

Ethics approval

This research study received approval from the University of Twente Ethics Committee of EEMCS and Computer & Information Science. The study was evaluated and showed no ethical concerns and registered under application #240007 and #240498. Given the nature of the research which includes personal diaries and co-creation sessions, personally identifiable information will be collected throughout this study. In this case, the individuals who will take part in this study will be provided with the necessary briefing and consent forms which they could revoke at any moment. Participants of the co-creation, awe experience mapping, and the user study are free to withdraw their participation and their entries even after conducting the study.

To safeguard the information provided by the participants, the application *Signal* was used to ensure that all information was stored safely following the GDPR. The experiments (co-creation, awe experience, and user study) began in January 2024. More so, the project does not pose any health risks, adverse effects, or the possibility to come up with possible accidental findings. All individuals involved in the study are adults aged 18 or older.

Chapter 5: Iteration 1 – Designing for Awe

Reframing of Research Question

The starting question was: *How can movement promote social interaction and a sense of awe through interactive installations?* In this first iteration, I decided to focus on mainly understanding two components, how movement can promote social interaction, and how movement could be utilized to evoke the emotion of awe within the context of interactive installations. To explore the phenomenon being addressed, I have made the decision to focus my attention on this iteration on evoking awe. Thus social interaction was not designed for within this iteration. This decision was made for the experiential reason to fully allow myself as the designer to explore the concepts one at a time.

Design and Concept

The first iteration of the prototype was initiated with the primary focus on exploring different form factors as a starting point. The concept of open-ended play (De Valk et al., 2013) and exploration played an integral factor and served as the initial inspiration for the concept of the artifact. Inspired by children's playgrounds, I focused on two key factors: the spatial dynamic aspects found in typical playgrounds and the natural affordances of playgrounds to encourage movements. The designs particularly focused on elements that could promote open-ended play; allowing people to freely interact with the various artifacts without any predetermined guidelines on its use.

Building upon the works of Ke and Yoon (2020) and their discussion on designing for awe in interactive installations, the form factor was of most importance to me during this phase of the exploration. Through the process of an individual brainstorming and brainwriting session, I listed a number of different playground equipment and took particular interest in playground spinners which often featured a spherical or circular design. These forms resonated with me due to its similarity to the previously discussed installation Jing Hua and Wish Happiness. These are the installations which interested me the most and where I felt the strongest sense of awe.



Figure 5.1. Circular Design in Interactive Installations and Playground Equipment³

Basing this decision purely on my interest and intuition, I deduced that this was because the circular design invites people to be able to see and interact with the artifacts from any direction, allowing for a full 360 degree entry towards the interaction. It provided me with the sense of *no beginning or end*. Thus approaching it or beginning anywhere would be possible. This circular choice is visible in the installation *Wish Happiness* (see previous chapter) where its circular design invites people to converge from all directions, focusing their attention towards the mandala and carousel. To add to this, I came up with the idea that these circular artifacts can influence a continuously self-generative soundscape. Thus the concept of sound generating *moving* spinners and a cylindrical shape became my starting point in prototyping the first iteration of the prototype.

³ Sources of Images: <https://www.yankodesign.com/2010/06/23/a-bowl-of-lumen-flowers/>;
<https://www.playlsi.com/en/commercial-playground-equipment/playground-components/topsyturny-spinner/>;
<https://pwap.com/holdnspin-spinner>; <https://unlonelyisland.net/wish-happiness-1>

Prototyping

Form Factor Design

As I began to prototype the form factor, I made the conscious decision to begin only with low-tech options. I utilized various materials such as plastics, wood, and foam and experimented with various iterations and forms resembling circular and spherical artifacts. Heavily inspired by installations such as *Jing Hua*, *Wish Happiness*, *I am the Sun* and also *The Pool*, the goal was to develop and arrive at a shape and form which I find appealing but also intuitive to use, offering little to no barrier. Through my experiment I came up with various shapes and artifacts. Some notable artifacts are as follows:



Figure 5.2. Notable Artifacts of Iteration 1

The different shapes provided a number of interesting affordances. As a simple experiment to see the various affordances of each prototype, I observed my peers' initial interaction with the artifacts. This was achieved by simply handing people within the prototyping workplace these different artifacts and simply observing their initial interactions with each artifact. Their initial and brief interactions provided *clues* to the various affordances of the artifacts. Some notable affordances can be seen below:



Figure 5.3. Notable affordances of Iteration 1

Based on my own personal experience and what I observed, I took particular interest in the shape of the sphere due to its simplicity in form but also the affordance that it gave. Thus the sphere became the final form factor within the first iteration of the prototype. More so, a string was added to the sphere as the initial concept was to have the spheres hanging from the ceiling to provide the impression that it is *floating* within the installation space.



Figure 5.4. First Prototype

Hardware & Software

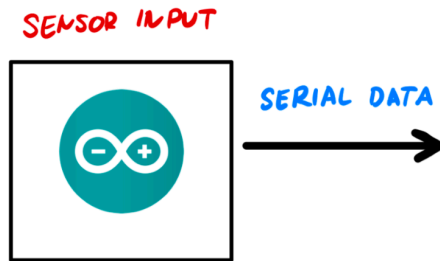
After deciding on the form factor, I can proceed to developing both the hardware and software to detect the different movements and interaction people would have with the artifact, and further mapping them towards various parameters within the soundscape. To achieve this, I utilized a set of electronic components. A complete list of the hardware utilized for the first prototype can be found below:

Component	Description and Function
Arduino MKR1000 x 2	<i>The arduinos acted as the main microcontroller utilized in this prototype. This specific version of the arduino was selected for its built-in wifi module. Within this context the two arduinos communicate wirelessly through a wifi hotspot, sending the data of the arduino attached to the sensor.</i>
9 Volt Battery + Battery Holder	<i>The 9 Volt battery acts as the main power supply for the arduino and the gyroscope.</i>
MPU6050	<i>The MPU6050 is a 3-axis accelerometer and 3-axis gyroscope. The MPU served as the main sensor to detect movements of the people on the sphere</i>
Laptop	<i>The laptop acts as the main receiver of data which will process all inputs into a generative soundscape.</i>

Table 5.1. Component List

The software architecture of the could be divided into three main sections being the sensor input, signal analysis, and MIDI Output. In the sensor input stage: data from the accelerometer is obtained and sent over through the wifi hotspot of the two arduinos. In the signal analysis stage, raw data is received by the second arduino, it will be sent over Serial to TouchDesigner to be analyzed. This process of analyzing on TouchDesigner allows the data to be processed on the CPU of the laptop instead of the Arduino, which in comparison has less memory. In the MIDI output stage, I will use the built-in function of Ableton-Link, which connects TouchDesigner and Ableton. I would then send this data to Ableton for it to be mapped to the parameters of the soundscape.

MICRO CONTROLLER



LAPTOP

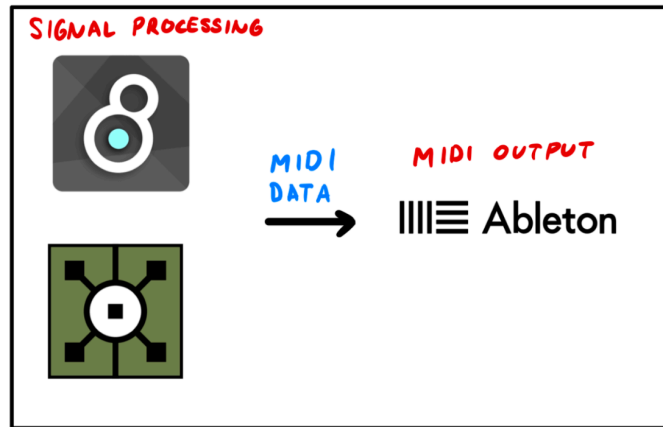


Figure 5.5. Software Architecture

Sound Design

Ableton was used to develop the soundscape of the prototype. I took inspiration from nature as a starting point for designing the soundscape of the first prototype. To achieve this, I made use of the Inspired by Nature Pack by Dillon Bastan (*Inspired by Nature* | Ableton) which contained various premade instruments. Due to my limited capabilities and skills in sound and music production, I would argue that the soundscape created was minimalistic and simple. Utilizing the generative instruments of Bouncy Notes and Tree Tone, I was able to create a simple but *calming* soundscape for the prototype. Then the sensor input was mapped to the rain parameter of the Tree Tone, which adds a degree of random noise that resembles water droplets. The more movement a person made, the more water droplets would be generated. This parameter called rain affected the sound effect which sounded like water droplets, the higher this value was, the more *rainy* the atmosphere became.

1st Cocreation

To end the first iteration, the first cocreation of the study will be organized. This cocreation was the first of two cocreations which aims to provide a deep dive into the concepts and theories of awe and to build upon the *woah* factor of the prototype. The co-creation acted as a kickoff for the group to be introduced to the concepts and theories of awe and discuss how to implement them into practice, while also kick-starting the awe experience mapping exercise. The purpose of this co-creation was trifold. First, to explore each person's personal experiences of awe. Second, to explore factors on how to build for awe through installations which build up on Ke and Yoon's (2020) previously proposed methods. And lastly, this cocreation acts as a scaffolding moment to build upon the current iteration of the prototype.

Cocreation 1: Methodology

Finding Participants

Participants were recruited from the DesignLab community at the University of Twente to recruit designers who specialize in various fields of design to provide a wide set of design perspectives. Before the co-creation, the recruited participants were requested to dedicate 20 minutes to watch a pre-made video compilation of interactive installations (mentioned in chapter 3). This exercise aimed to familiarize the participants with the concepts of awe while also encouraging them to reflect on their past experiences when experiencing awe and extracting key design elements which creates the *awe-like* experience.

Workshop Methodology

The workshop will commence with a casual and relaxed atmosphere alongside music and snacks to help set the right mindset and ease the participants into the session while promoting a creative and exciting environment. Afterwards, consent forms will be signed followed by an introduction to the theory on the emotion of awe and how it could be implemented into interactive installations.

Following this refresher and plenary session, the workshop will transition into a more interactive section in which the participants will be asked to create a collective mural on the emotion of awe. The participant will be asked to recall moments of awe; either from personal experiences or what they believe evokes this emotion and expressing them through pictures, drawings, or texts. This exercise aims to visually capture the group's perception of awe and further also provide contexts to where this emotion is often experienced. After this, a short break will be provided for the participants, while the researcher prepares the materials for the second half of the session.

Following the break, a bodystorming exercise will be conducted in which participants will be asked to follow their intuition and move their bodies the way they see fit. The participants will engage directly with the current prototype. Here it is encouraged that the participants explore and interact with the prototype intuitively, without much guidance, and explore different ways they would want to interact with the prototype. During this period, observations will be taken in the form of notes and pictures which will be analyzed on a latter stage. Next, a scaffolding exercise will be conducted in which the participants will be provided with various materials to physically build upon and alter the state of the existing prototype.

Inspired by embodied sketching design practice, both the bodystorming and scaffolding exercises aim to “(i) support ideation rather than evaluation, (ii) support the inclusion of bodily experiences early in the design process, before the construction of fully-functional prototypes, and (iii) spur creativity by harnessing play and playfulness, in a way that is grounded in and

inspired by the lived experience” (Márquez Segura et al., 2016). The focus here was not to evaluate the prototype, rather it is to add elements into the prototype which could increase the likelihood of the artifact to evoke awe.

The workshop will include an introduction to Signal, a messaging platform known for its state-of-the-art end-to-end encryption (*Signal Messenger*). This platform was chosen for its features which comply with the GDPR and provide data security for all its users. Using this application, participants will be asked to document their own experiences of awe. After everyone is added to the group conversation on Signal, they will receive guiding questions on how to structure their posts while also providing them with reminders to record any moment of awe that they might experience throughout the following weeks. Following this, the first co-creation session will officially end.

Workshop Materials

To facilitate the workshop, the materials must be prepared in advance. These materials for the workshop included the video compilation of interactive installations, including additional texts for background information which the participants would need to watch before the workshop. For the workshop itself, physical materials were provided. These included A2 & A3 papers, post its, glue, scissors, printed pictures from magazines, and online sources. Finally, a set of physical tinkering and prototyping materials are also provided to facilitate the scaffolding section of the co-creation. Royalty-free images were obtained from various free online picture repositories and assembled into collages to be printed; These images will be used for the collaging activities of the co-creation.

Cocreation 1: Results

The first co-creation entitled: Designing for Awe: Co-creation & Kick-off took place on the 16th of January 2024. A total of five designers joined the project as participants of the (two) co-creation and also the experience mapping exercise which will take place after the first co-creation. Each individual specialized in their own field of design which includes UI/UX, game development, Music Production, Industrial Design, and Interdisciplinary team dynamic design. The tables and images below summarizes the results of the first co-creation. (See Appendix A: Cocreation 1 Result Images for additional materials).

Plenary Session on Interactive Installations	
Awe Evoking Installations	<ul style="list-style-type: none"> ● I am the Sun ● Touch ● Jing Hua ● Sync

Experience of Awe	<ul style="list-style-type: none"> • A feeling of connection and belongingness • Unpredictable • “Makes me feel small” • An amplification of ‘something’ • Extreme Controls: potential to evoke awe
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Table 5.2. Results of plenary Session of Awe

Collective Mural	
Emergent Themes	Description
Ritualistic Experience	Experiences which involved the concept of a higher power or collective moments of gatherings
Extreme Contrast	This <i>feeling</i> of being extremely small or large in comparison to the experience. Or described as extreme contrast to perceived expectations.
Nature	Experiences which involves any form of the wild or outdoors
Geometry	Visualizing or viewing complex and symmetrical geometries

Table 5.3. Emergent Themes from Collective Mural

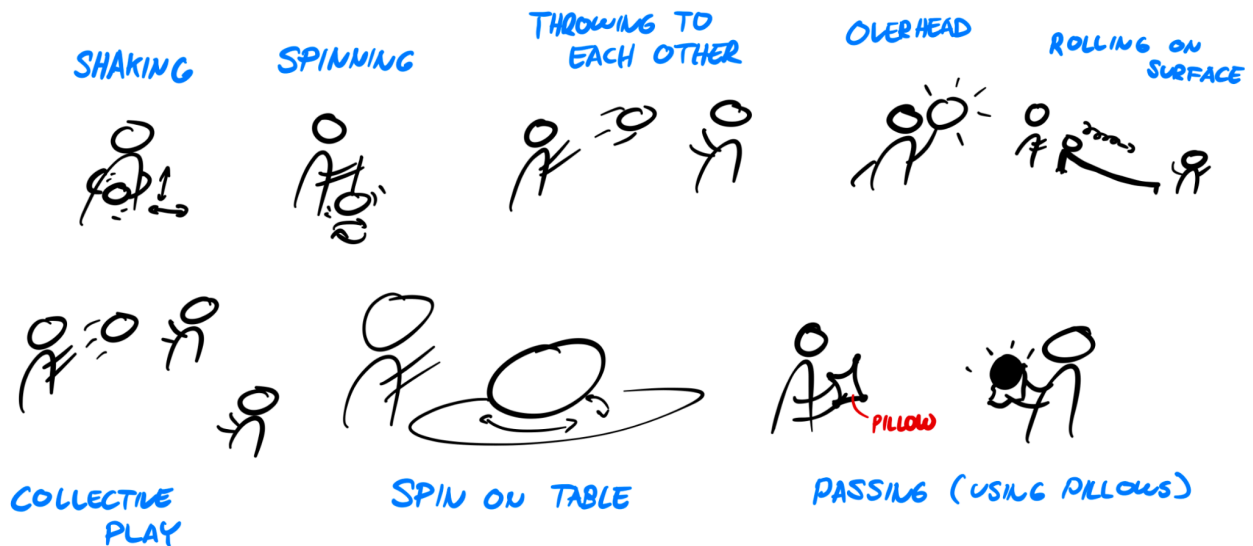


Figure 5.6. Key Observed Affordances of the prototype during bodystorming

Key Suggestion moving forward (Scaffold Session)

Interaction Design	Add extreme controls & contrast within the input and output of the system
	Reflect on the Passive installation better than an active one? What is the need for an active experience?
Concept Design	Ritualistic & temple-like structure
	Nature should be used as a form of inspiration
	Focus on space: create an area which allows people to explore the experience

Table 5.4. Key Suggestions from co-creation

Intermediate Reflection

The first iteration provided a great initial insight to how awe is experienced and how we can design for it. Throughout the course of the first iteration, I have explored various artifacts and how we can design for awe through an interactive installation. This resulted in a first prototype; a sphere which creates a soundscape when it is being moved around. More so, through the co-creation session, we were able to identify key design elements such as extreme contrasts, and sense of collaboration and connectedness, while also having a deeper understanding of how we as designers can design for awe.

Insights from Co-creation, Prototyping, and Theory

Exploring the various affordances provided crucial insights to how the prototype will be interacted with by various users. As seen in the co-creation, the affordance of the sphere leads to the emergence of both individual and collective interaction with the sphere. More so, the addition of the soundscape providing an initial starting point for awe to be evoked as visible facial expressions of awe was observed the moment they noticed how the sphere influenced the soundscape. From this, I am able to make a list of all the ways people would interact with the object giving me valuable insight to what information and data I should be mapping from the natural interactions which the people make with the spheres, further mapping them into meaningful audible feedback within the next prototype.

The results from the co-creation regarding the emotion of awe aligns closely with the theoretical expectations. The participants found awe in themes such as geometry, nature, and hints of collective experiences as seen by the collective mural which was made. This relates back to various awe elicitors proposed by Keltner and Haidt (2003) in which awe could be

elicited through nature, human arts and artifacts, and also various social relationships. This could suggest concept development of the prototype which aligns with one or more of these electors of awe could be a direction which could be explored within the next interactions.

The current state of the prototype lacks bold feedback. The participants of the co-creation found it difficult to notice the mapping between the movements and gestures the group made and the influence it had on the soundscape. Simply put: the soundscape was not contrasting enough for the *audience* to notice (1) that they are in control of the system, (2) how their actions influence the system. This could be referred back to Ke and Yoon's fifth strategy in designing for awe: Rapid Changes and Uncontrollable behavior which suggests that "the designed object or experience should not be fully controllable by the users, and its quality keeps changing".

Although the sound design was made in such a way that it will keep changing, the prototype failed to suggest to the group that they are in *partial* control of the condition of the system. From this, it can be deduced that within the next iterations, one key design choice is to create more contrasting and bolder expressions which people can easily notice as they interact with the artifact.

The findings of the co-creation hinted at an interesting insight into social coordination and its role in evoking awe. It was suggested that competitive elements within an interactive system do not promote the emotion of awe, rather diminishes it. Comparing the installation of Lightwaves to that of Touch and Jing Hua, the participants suggest that Lightwaves would turn people's focus to themselves as they try to *out-compete* others. In comparison to Jing Hua and Touch which promotes collaboration or connectedness between the various users as they have to work together and collectively participate in a shared activity.

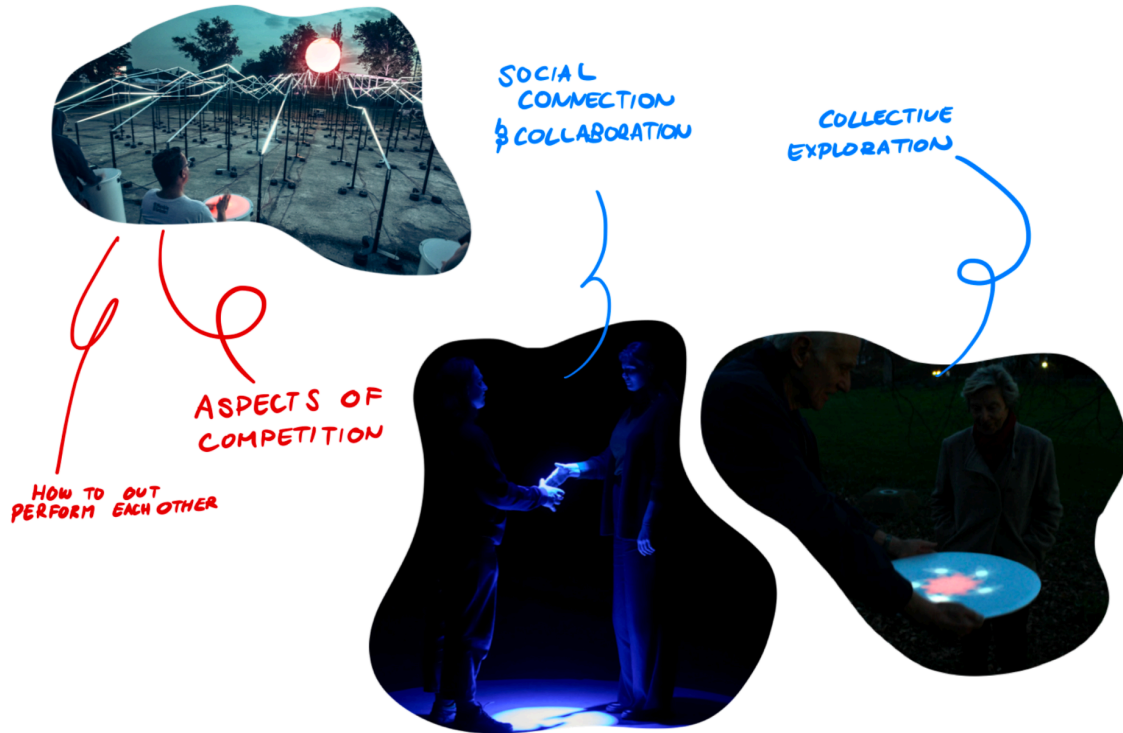


Figure 5.7. Competition versus collaboration

This insight is significant in three ways. First, this aligns with the theory of awe which suggests that the experiencing of awe leads to a diminishing of the self (Monroy & Keltner, 2022), within the context of competition, the focus would be on individual performance. This hints that various social conditions could influence how awe is experienced within the interaction and the social context, while also suggesting the importance of social coordination and participation within the context of awe. This concept of collaboration was already suggested by Ke and Yoon in active participation in a collective in which “Participatory activity in which many people can partake simultaneously to work towards a common goal or interest” (2020). Here we can also see elements of De Jaegher & Di Paolo (2007) theory of participatory sensemaking coming into play in which the participants would have to collectively participate and engage within the experience to collectively sense-make what they are experiencing.

This insight resonates with the suggestion that interactive installations could be a medium for people to experience collective awe through collaboration and social coordination. This was made evident during the bodystorming of the cocreation in which the participants were throwing the sphere to each other. They start with a sense of awe as they notice the initial interaction of the sphere with the soundscape but it soon becomes a collective activity in which they share together.

The collective play that occurred between the participants was exactly what I was looking for. It is evidence on how the shape of the sphere could turn into an open ended experience which could invite others to join into the experience, beginning from awe and inviting others to participate in the same collective activity. One participant responded after the bodystorming exercise, “I dont know what to write to be honest, I just had fun”. This is a glimpse of the phenomenon which I am describing within the phenomenon of collective awe; in which people would start from awe and turn into an embodied shared activity.

Personal Lived Experience

This entire iteration has broadened my understanding of awe. The more I learn about awe, the more I begin to experience awe myself. I am beginning to notice more awe from once every few days, to once every few minutes. I have been really able to become much more present in the world. Really being able to notice even the smallest of mundane things. Such as the two birds flying in synchrony, or just a group of people talking and sharing an talk together. Within the process of this iteration, I learnt that feeling pressured to create something which is inherently beautiful, is counterproductive to evoking awe. This struggle further helped me understand the difficulty in translating the experience of awe into a meaningful design.

The study of awe has made me much more present, conscious, of the world around me. During one of these days, I was in awe of the amount of colors I saw as the sun was setting. One of my first initial reactions that followed was to ask the people around me to come and also take a look. I believe there is something fundamentally unique about sharing moments of awe with others. As I briefly mentioned in the previous subsection, there is a lack of quantitative data to suggest that collective awe is any different from awe when experienced alone.

However, my own lived experience of this phenomenon leads me to believe that awe becomes better once you can really experience it together with others. Being able to make sense of the mysteries of the world together is just one of the many experiences that we as humans seek. There is something in experiencing awe together that is difficult to quantize. However it is there.

Future Direction

Throughout this iteration, we have explored the concept of awe, identified which design factors could be implemented to evoke awe. More so, key affordances of the current prototype were obtained. This iteration provided valuable insights into the design elements that could evoke awe while also providing an initial direction on how to design for social coordination and participation. However, we have not explored the specific design factors needed to facilitate social participation and collective awe within the context of interactive installations. Within the next iteration, it is imperative that we focus our attention on exploring the design factors that could facilitate social interaction which could lead to these collective moments of wonder.

Chapter 6: Iteration 2 – Designing for Social Connection

The second iteration began on February 19th of 2024 Monday. Building on the insights gained from the first iteration, the second iteration began with a detailed analysis of the feedback gathered during the co-creation session, alongside new theories that emerged from both the co-creation activities and the reflection through process of the first iteration.

The steps taken for this iteration was similar to that of the previous iteration with the exception that the experience mapping was added to the process. As awe was given the most emphasis in the previous iteration, this iteration focuses on how designers could facilitate the space and conditions that could allow for these shared experiences of awe. Thus the focus of this iteration mainly lies in designing the social and collective element of the prototype.

Reframing of RQ

New insight provided a direction on how then can awe be a shared experience rather than individual exploration. This main aspect came corley to the social aspect of awe and how experiencing awe together would be different than exploring it alone. Thus as 11th of March 2024, the research question was reframed to: How do we design for the shared experience of awe through interactive installations? To further understand how we can design for this shared experience, I made the decision to focus the second iteration on designing for the social aspect of awe.

Design and Concept

The conceptualisation could be said to have started at the first co-creation. The concept was built upon the results and suggestions provided by the group during the co creation and also the insights gathered through the theory. Based on the co-creation, I decided to make my main focus to add more contrast and bolder expression within the design. The aim of this is to ensure that the people engaging in the artifacts can easily perceive their actions quicker and more clearly. More so, I decided to move into nature as an inspiration for the sound design of the prototype. As the initial sphere was a shape which interested the group (and myself), I decided to push forward with the idea that the final prototype will be in the shape of a sphere. Thus I focused my attention towards the sound and interaction design of the prototype.

Prototyping

Form Factor

Building upon the idea of the first iteration, the next step for the prototype was to reproduce the prototype into a total of five spheres. Although the final installation could have more than five spheres, I decided to create five spheres to match the number of participants within the session. Since the form of the sphere has already been decided, the focus of the prototyping phase was to replicate the current sphere into five spheres.

The concept of a circular placement of the spheres came into play. However, the question still remains on how will it be placed? What physical space will the object take up? Multiple ideas were generated to tackle this such as hanging them from the ceiling or placing them each on individual poles. As the project was still in the middle phase, these questions were placed aside for the time being to focus on the replication of the spheres.

Hardware and Software

Multiple changes were made in regards to the hardware utilized within the second iteration. The main changes were the use of Arduino Uno instead of the Arduino MKR1000 and the addition of the NRF24LO1 modules for radio frequency. A complete list of hardware used in the second iteration is shown below:

Component	Description and Function
Arduino Uno x 5 (Spheres)	<i>The arduinos acted as the main microcontroller utilized in this prototype.</i>
Arduino Uno (Receiver)	<i>This Arduino will be the receiver microcontroller</i>
NRF24LO1	<i>These radio frequency module allow the arduinos to send data packets to one another through RF protocol</i>
9 Volt Battery + Battery Holder	<i>The 9 Volt battery acts as the main power supply for the arduino and the gyroscope.</i>
MPU6050	<i>The MPU6050 is a 3-axis accelerometer and 3-axis gyroscope. The MPU served as the main sensor to detect movements of the people on the sphere</i>
Laptop	<i>The laptop acts as the main receiver of data which will process all inputs into a generative soundscape.</i>

Table 6.1. Component List

No major changes were made in terms of the software architecture of the design. There are five spheres sending input to the receiver arduino. More so, data is being sent over through radio frequency instead of wifi. A diagram shows the data flow below:

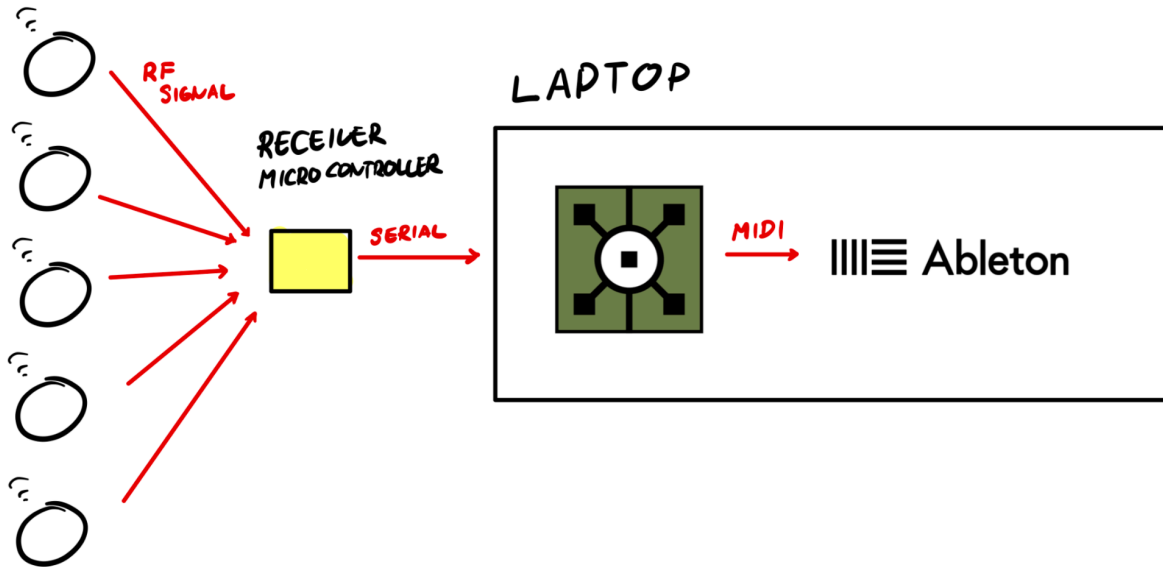


Figure 6.1. Flow Architecture

Sound Design

Initially, nature inspired sounds were chosen for the installation based on the feedback of the participants of the co-creation. Audio field recordings were done to see what sounds caught my attention and I attempted to implement them within the soundscape. However, due to the difficulty in implementing this approach, this direction was soon scrapped. I took a different approach to the sound design in which I attempted to use musical stems⁴. I composed a set of different musical melodies, harmonies, and beats which would be played depending on the rotation of the sphere. This was made possible with techniques such as chord progressions, arpeggios, and random notes which are played in the same key. Each sphere would then control one of these musical elements which they could augment based on the rotation of the spheres (See Appendix D: Online Repository). This was done primarily to ensure the difference in contrast and to create bolder expressions of controls, as suggested by the feedback from the previous co-creation. However, due to my limitation and experience in sound design, the result of the soundscape was simple and repetitive.

⁴ “Stems are stereo recordings sourced from mixes of multiple individual tracks, such as drums, vocals, and bass. For example, a drum stem will typically be a stereo audio file that sounds like all of the drum tracks mixed together.” (Source: <https://www.izotope.com/en/learn/stems-and-multitracks-whats-the-difference.html>)

Interaction Design

The interaction design for the second prototype could be divided into two main interaction sections: the person-artifact interaction, and the person-person interaction.

Person - Artifact Interaction

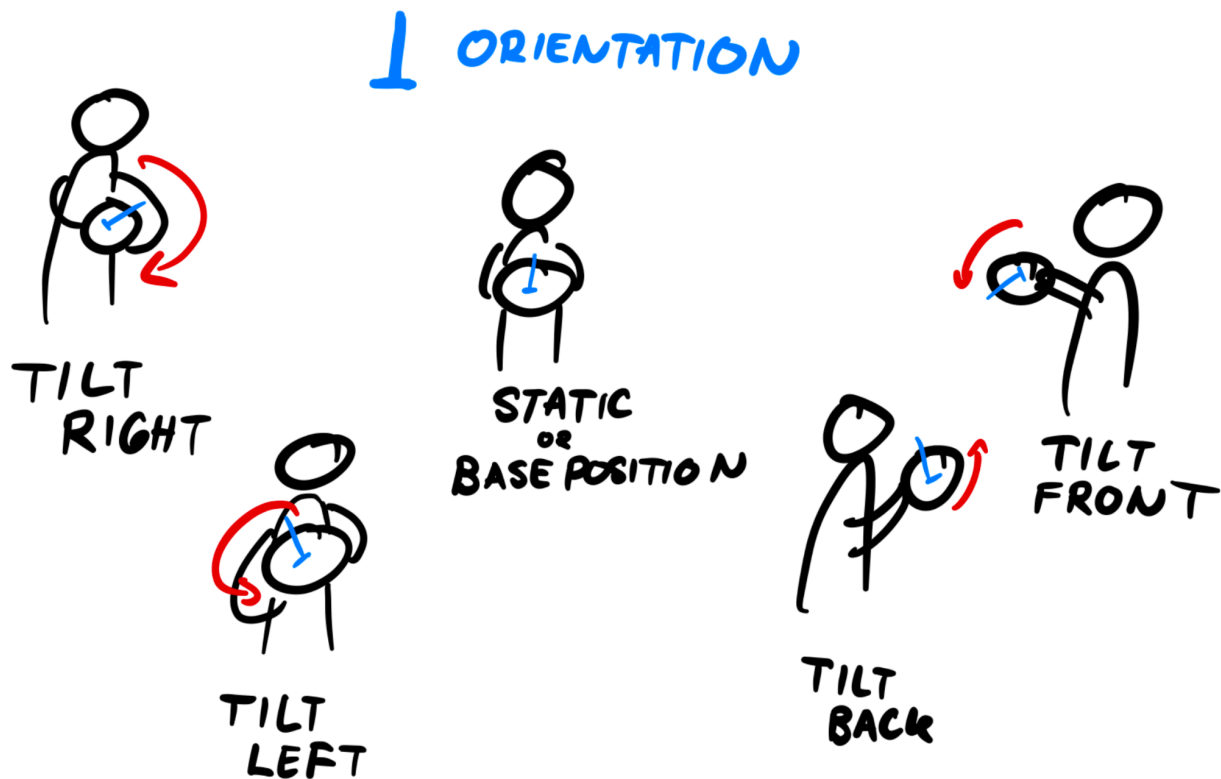


Figure 6.2. Rotational Interactions

Unlike the previous iteration, where acceleration data would be mapped to the sound of rain, within this iteration I utilized the degree of pitch and roll. This gave me four possible interactions which could occur between the person and the artifact. The user can simply tilt the sphere in the four directions and after a certain threshold is passed, a different sound would be played. Thus, the motion of the prototype was solely based on the orientation, rather than the movement of the sphere. It was designed in such a way that participants would have to rotate the sphere in a certain direction to *trigger* a certain sound loop. Between the user and artifact for this iteration, due to the limited capabilities and struggle with synthesizing of all the different components, I focused mainly on tilting of the spheres.

Person - Person Interaction

As mentioned previously, each of the five spheres will control one component of the entire soundscape. This concept allows each individual to control 4 different musical loops of a certain instrument which allows people to collectively generate a soundscape of their own. Utilizing this concept it was hypothesized that each individual would have a clearer idea of their own influence of the system while also collectively building upon each other's contribution through the tilting of the spheres.

Awe Experience Mapping

Throughout the weeks in between the two co-creation sessions, the participants will be asked to journal a few times a week in which they have experienced emotions of awe. The participants will be asked to actively be present towards their own daily experiences, while also being motivated to go for an *Awe Walk*, an exercise which requires the participants to actively go for a walk and find awe in the different things they experience. Based on Sturm and Keltner (2022), they will be instructed as follows:

- 1. Tap into your childlike sense of wonder. Young children are in an almost constant state of awe since everything is so new to them. During your walk, try to approach what you see with fresh eyes, imagining that you're seeing it for the first time. Take a moment in each walk to take in the vastness of things, for example in looking at a panoramic view or up close at the detail of a leaf or flower.*
- 2. Go somewhere new. Each week, try to choose a new location. You're more likely to feel awe in a novel environment where the sights and sounds are unexpected and familiar to you. That said, some places never seem to get old so there's nothing wrong with revisiting your favorite spots if you find that they consistently fill you with awe. The key is to recognize new features of the same old place.*

Adapted from: Sturm and Keltner (2022) in *Awe: The Transformative Power of Everyday Wonder*

To build upon their exercise, the participants were asked to find awe wherever they were, not only during walks. More so, they will be provided a set of guiding questions to help them structure their experience into a cohesive short journal. These questions include:

- 1. Describe the scenario*
 - a. What was the setting?*
 - b. When and where did it take place?*
 - c. What were you doing?*
- 2. What caught your attention?*

3. What stood out to you that made you go “woah” or “wow”?

The awe experience mapping took place between 16th of January and the 5th of April. Between these dates, the participants shared their various experiences of awe which they encounter in their daily lives. These experiences vary greatly. It was estimated that each participant would provide 2 to 3 experiences a week, leading to an estimated number of 60 entries. However only a total of 14 experiences were collected from the five participants. These diary entries can be found in the appendix. (See Appendix B: Experience Mapping Results).

Cocreation 2

The goal of this session will be to understand how to facilitate collective movement through design, reflect on the awe experience mapping which was conducted, while also building upon the current state of the prototype.

Workshop Methodology

The workshop will begin with a similar walk in to that of the previous iteration. Following the walk in, we will proceed to discussing the awe experiencing mapping exercise which has been conducted between the two co-creations. The goal of this exercise is to reflect on the various experiences they logged, while also reflecting on the exercise on a general and personal level. From here, we will then identify and extract possible design choices which could be made from the collective personal experiences of the group.

Following this, the group will be introduced to the concept of collective effervescence. From this, the group will be asked to recall moments in which they felt awe together with others. The group will try to recall moments in which they believe they have experienced collective effervescence. The goal of this exercise was twofold. This exercise will provide insight to the participants' own experiences of collective effervescence while also familiarizing themselves with the concept.

After a short break, a group activity will be conducted. This exercise is inspired by a form of theater improvisation exercise. Here, everyone including the researcher will be asked to stand in a circle together. Counting from 1 to 3, everyone would then take a deep breath while raising their hands. Without communicating through words, everyone must try to sync up their movements and try to exhale quickly at the same time.

The goal of the exercise is to accommodate the group to *sync* with each other and to learn how to communicate with each other through being present and without words. This way the group will be more accustomed to the experience of collective movement and communication without speaking. This exercise acts as a bridge to the bodystorming exercise which comes after.

Similar to the first iteration, the group will then explore the current state of the prototype. Given the state of the prototype, the participants will need to learn how to communicate and sensemake together.

Following this, a context mapping exercise will be conducted. Given the new knowledge about awe, collective effervescence and their experience with the prototype, the participants will be asked to provide a possible context which they see fit for this type of installation. The goal is to move away from the artistic domain and to see under what context would this type of prototype fit best in? To simply put: Find possible use cases where this form of installation might be useful to a certain target group. The session will then end with a scaffolding session in which the participants will be asked to build upon the current state of the prototype

Workshop Materials

No major changes of materials were made for the second iteration. Similar materials such as A2 & A3 paper, glue, scissors, and physical prototyping materials were provided for the participants.

Cocreation 2: Results

The second co-creation took place on the 5th of April from 12.00 to 14.00. Due to personal circumstances only four out of the five people were able to attend the co-creation session. The following section will summarize the results obtained from the session. The tables below summarizes the results of the second co-creation. (See Appendix B: Experience Mapping Results and Appendix C: Cocreation 2 Result Images for additional materials).

Reflection on Awe Experience Mapping	
Reflection Points	<ul style="list-style-type: none"> ● Low number of responses could be attributed to high stress period of the academic year ● Awe was found to be difficult to verbalize ● A few sentences and a picture does not encapsulate their entire experience ● Group questioned whether their intention for their awe experiences were authentic (or only due to research)
Relating experience to possible design factors	<ul style="list-style-type: none"> ● Awe should be visual and tactile ● Attention to detail; everything must <i>fit into place</i> ● Immersion ● Funnel all attention of the user into the interaction

Table 6.2. Reflection on Awe Experience Mapping

Collective Effervescence	
Key Points	<ul style="list-style-type: none"> • Emphasis on number of people (intimacy versus collective) • Is collective effervescence another word for hype? • Experience and exploration rather than action and reaction • Proximity (physical distance) • Syncing up of sensory experiences • Permanence → how long can this experience last • Improvisation Choreography: Harmonizing without expectations

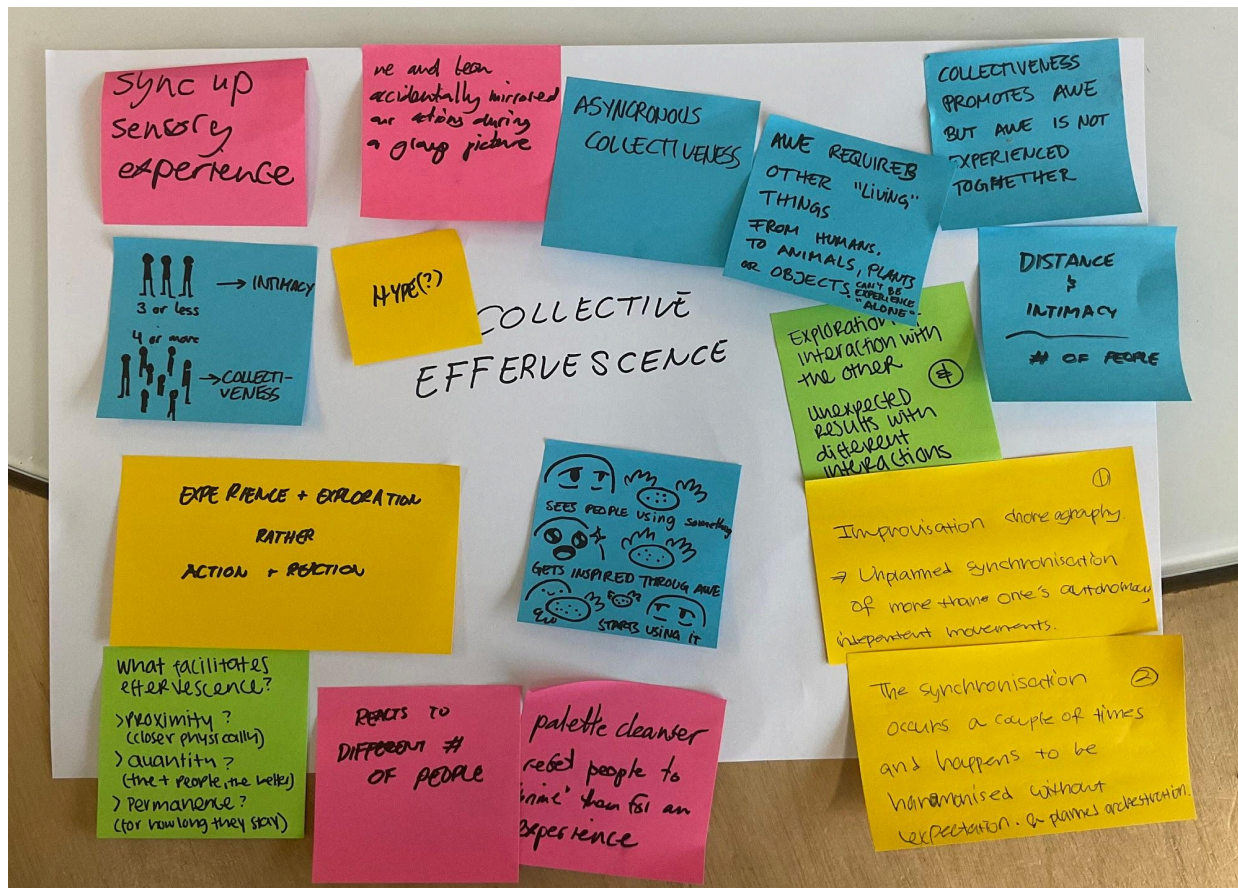


Table 6.3. & Figure 6.3. Results of plenary on Collective Effervescence

Group Activity: Theater Improv Exercise	
Key Observations	<ul style="list-style-type: none"> • Group was initially confused on task • After a few iterations, the group finally understood the assignment • After a few tries the group managed to collectively sync and exhale together

	<ul style="list-style-type: none"> ● People paid attention to each others micro expression ● There is an initial <i>lead</i> who discretely signals that they are going to make the move ● Group found the exercise interesting and noticed how they would pay attention to each others actions to communicate to each other
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Table 6.4. Observations from Theater Improve Exercise

Bodystorming	
Key Observation	<ul style="list-style-type: none"> ● The participants explored various actions ● As one participant identified how the orientation of the prototype affected the soundscape, the group began to explore the prototype together. ● They coordinated their actions in such a way that each person would have the prototype in the upright position (producing no sound). ● One by one, they would try to tilt their prototype to identify which soundscape or sound quality belongs to their action. ● Once they collectively figured out how the installation was set up and what interactions were expected of them, the participants began coordinating their actions by exploring the various combinations of different sounds they could make by tilting the spheres in different directions together.
Additional Notes	<ul style="list-style-type: none"> ● Technical difficulties were encountered forcing the cover of the sphere to be removed, leaving the internal components intact. ● This left the participants with only the bare electronics

Table 6.5. Observations from Bodystorming

Possible Use Case	
Study Orbs	Orbs which could be placed throughout the study area.
Festival Installation	An interactive installation in festivals to facilitate collective awe
Dancing wearable	A wearable for dancers to use to generate sounds

Everyday objects	Integration to daily everyday life objects
People with limited mobility	Could be utilized as a medium or instrument specifically tailored to their needs
Children's Hospital toy	An installation within children's hospital to help children play and connect with one another
Smart Cutlery	Immersive dining experience in the form of smart cutlery where moving the cutlery influences the sound scape
Alarm clock	Motivating to get up and be active
Team brainstorming	Knowledge exploration in a group setting

Table 6.6. Possible Use Cases

Scaffolding and future suggestion	
Collective Creation	The interaction should build upon other people's interaction with the installation. The sense of awe should also be able to emerge as a result of these collective efforts.
Non-competitive interaction	Ensure that the interaction is collaborative rather than competitive.
Music Selection	Choosing the right sound design can greatly influence the experience. It is crucial to consider the target audience or choose a neutral form of sound design.

Table 6.7. Future Direction and suggestions

Intermediate Reflection

Collective Effervescence

During this second iteration of this exploration, I discovered the concept of collective effervescence. Gabriel et al describes it beautifully:

“collective effervescence is best understood as a combination of feeling of connection to others and a sensation of sacredness; that collective effervescence is experienced in common, everyday kinds of events; and that experiences of collective effervescence experiences are related to positive outcomes such as life satisfactions, a feeling of awe, social connection, and perceived meaning in life” (Gabriel et al., 2020)

Relating it back to the phenomenon of collective moments of awe, collective effervescence perfectly describes this experience of experiencing the emotion of awe together with others. Think of a time you watched a football match and your team scored the winning goal, the energy you feel as everyone around you celebrates with you. Think of when you last sang your favorite song during a concert within a pool of people. The discovery of the theory of collective effervescence was a *eureka* moment for me. It provided a conceptual framework and scientific grounding to the phenomenon I am exploring. Collective effervescence is a feeling of ecstatic emotion or action amongst a group and awe could be considered one of these ecstatic emotions. Collective effervescence is not awe. But awe when experienced together is a form of collective effervescence.

Insights from Co-creation, Prototyping, Awe Experience Mapping and Theory

The awe experience mapping theory provided very interesting insights to how people can find awe in their daily lives, what was surprising was the fact that there were a low number of responses to this. Not only did the awe experience mapping reveal the difficulty of verbalizing into words, but it also showed how dissecting the experience in of itself does not encapsulate the entire experience. Moreover, one participant even suggested that writing down the experience into an entry does not fully encapsulate the entire story, thus proving difficult to write about. more so the group also questioned their intention. Oftentimes they asked whether they are experiencing awe because they feel it or whether they are doing so because of the research.

Furthermore the stressful academic period during which this exercise took place was also mentioned by the group to may have affected their ability to experience all which could suggest how our ability to experience awe could diminish with rising stress levels. The experience

mapping which lasted around 8 weeks only resulted in 14 entries. Despite the low number of entries. The shared experiences were in line with the data we have collected during the first iteration. All the posts could be linked to a form of awe factor such as feeling small, nature, amazement of the physical world. One post that stood out, describes about a ritual which made the writer felt connected to others while feeling a sense of awe:



Figure 6.4. Awe Experience Entry: Korean Holiday Daeboreum (Source of picture unknown)

“Last Saturday was a Korean holiday, called Daeboreum, where Koreans celebrate the first full moon of the new year. I just habitually started cooking at home and making Korean foods for my boyfriend parents. I was not fully sharp or conscious due to pretty heavy drinking on Friday night. Kind of dull state, it was. In the kitchen, I checked a couple of pictures of Koreans performing celebratory rituals, and I found this picture of Ganggangsullae,. I immediately happened to imagine myself dancing together with those women in a beach. It might seem like just a group dancing or activity. However, back in a day where scientific knowledge was lacking, those ritual dances were kind of how people probably dealt with uncertainty and strengthen solidarity using their spiritual knowledge. I felt soft of interconnectedness with the past and somewhere present in Korea[ns] where those rituals would probably being conducted. It’s like awe.”

- *Awe Experience Entry from one of the participants.*

From my interpretation of the experience, the emotion of awe which was evoked came mainly from the sudden mental realization of how these *rituals* formed a sense of connectedness for people; especially during the times of the lack of scientific knowledge. What is interesting about this experience is how collective activities act as a medium for the emotion of awe to emerge; even for people who are not involved in the activity. This was one of many examples which enabled me to further understand how we can design for this complex emotion.

Based on the reflection with the group and further building upon the results of both iteration one and two, there are three key design factors which could be extracted to create more awe evoking experiences:

Attention to details: All aspects of the experience just *makes sense or fits together*

Visual and Tactile: Awe was described as an experience which should both be inviting visually but also beginning from the touch.

Focused Convergent: An awe experience focuses the entire attention and senses into the experience; creating a moment of immersion

During the focus of this iteration I was not fully designing for the experience, rather I was designing based on my capabilities and adjusting my concept based on what my current design skills are. This resulted in an ineffective prototype which I would argue caused more confusion rather than awe as seen through the bodystorming exercise. Although the bodystorming exercise did not go according to its original methodology, it provided a critical insight to how people experience awe together. Based on my observation I argue that there are levels of awe in which people experience together. As the group began to explore the prototype, it was evident that people were trying to identify which instrument belongs to them and what happens when they play it together.

This was evident when people were initially shocked at the discovery of various sounds which emerge from the spheres. The moment they discovered what and who is controlling the sound, I could see visible expressions of surprise on their faces. This exploration continued as they collectively tried to make sense of the prototype. It might not even be awe in this case, but rather a moment of discovery, experiencing, or learning something new. This buildup towards an unexpected outcome, or the process of exploration leading to a moment of discovery or exploration, can be considered an important factor of facilitating awe. This insight is crucial as it provides us with an understanding of how awe can be built throughout various levels of interaction.

Personal Lived Experience

It was ironic and paradoxical as throughout these weeks of the second iteration, I was trying to design *for* awe, yet I found myself experiencing less and less awe as the weeks progressed. This then resulted in the belief of no progression on the study which resulted in stress and lack of awe. The struggle in designing mainly manifested in the sound design which took a majority of my time during this second iteration. Due to my limited capabilities and Music and Sound production and also the lack of direction for the sound design made it difficult for me to fully create the soundscape of the installation. None of the works I made evoked any sense of awe or wonder for myself. This lack of experience not only made it difficult for me to design, but it also made it difficult for me to fully comprehend the experience of awe itself. I found myself

trying to dissect awe in a more analytical perspective rather than relying on the phenomenon itself.

Nearing the end of the iteration I stumbled upon a bookstore in Rotterdam where I accidentally found a book entitled *Awe: The Transformative Power of Everyday Wonder*. And in that book came my discovery of collective effervescence. This discovery helped me realign my understanding of awe and these collective experiences. When I first read about collective effervescence I remembered the emotion of awe that I felt. It was a Eureka moment for me, it was also a moment of discovery which made me realize that I was not the only one who is witnessing and experiencing this phenomenon of collective experiences of awe.

From this I was able to notice more moments outside the individual context rather than moments of collective experiences, such as when I ran the Enschede half marathon or simply spending a Saturday evening with my friends. It was really through learning the theory of collective effervescence that I was able to notice more of these moments in my daily life. This phenomenon of collective effervescence will continue as one of my main theoretical frameworks moving forward in this research.

Future Direction

This phase of the research I discovered many things in regards to designing for collective experiences and social connection but I also learnt a lot about the role of experiencing the phenomenon and staying close to it as a designer myself. The academic stress and technological challenges accompanied by unsuccessful attempts made it difficult for me to experience awe. However the integration of collective effervescence into my framework and new understanding of awe has opened up a new space for me to experience awe through a collective manner.

Moving forward it is important for me to prioritize understanding how to design for collective effervescence and awe. Collective effervescence will be one of the driving factors for the next iteration. More so, I will need to focus on designing interactions which build upon the affordances of the spheres rather than forcing a form of interaction. Furthermore, I will need to return to a more phenomenological approach, further adopting a more intuitive way of designing through experiencing the phenomenon of awe and collective effervescence.

Chapter 7: Iteration 3 – Designing for Collective Effervescence

Reframing of RQ

In the second iteration, we learnt of collective effervescence, which could be considered as the pivotal moment within the research, as it provides a theoretical background towards the phenomenon of collective experiences of awe. By combining the insights from the two iterations (which focused on awe and social connection), we can synthesize the two elements to focus on the aspect of collective effervescence. As of 18th of April 2024, the research question was reframed to: How can we design for the collective effervescence of awe through interactive installations?

Design and Concept

For the third iteration I focused on creating a high fidelity prototype of the current concept. Based on what was discovered and the previous iterations, I will need to move away from electronic sounding soundscapes and move back to much more natural and organic sounds. These could entail sounds such as water heartbeats and rhythms utilizing simple analog instruments such as the guitar and the piano. The challenge would be to create this in such a way that is still uplifting and also engaging to listen to.

Furthermore, the form factor of the prototype was of concern as it has not yet been decided in the past two iterations. From the two iterations, especially the second co-creation I realized the importance of people being able to see each other. This was made evident as the participants were in a circle when they were experiencing the prototype. I argue that this circular layout has always been something that is seen in ritualistic and religious events or even communities. There's something about sitting around something and sharing the experience together which makes it feel *sacred*. Take the example of how we gather around a bonfire or a football stadium where everybody could see each other and share our attention to one common focus. One key factor that I see is that people need to be able to see each other in order to feel the sense of connection.

Within this iteration I also want to focus on the different affordances of the prototype. As mentioned through the co-creation session the affordance of the sphere was not fully tested but returning back to the fact that in iteration one I noticed various movements, I want to prioritize more dynamic movements such as rotating or shaking rather than simply tilting as this was not as intuitive as I thought it was.

The final concept is five spheres which influence a soundscape. In this iteration I added visual feedback in the form of lights which glow around the sphere. Initially light and sound will be generated once a person interacts or moves the spheres. The moment multiple people begin to interact with the sphere, the lights will begin to illuminate with the same color. Providing visual feedback of syncing. More so, this will unlock a new layer within the soundscape.

Returning to the affordance of the spheres, I initially designed the spheres to be shaken around, however after a closer observation with my peers, I noticed that due to its current affordance and weight, more people are inclined to rotate the sphere in different directions rather than shaking it. The sphere did not give affordance to throw or shake but rather to rotate. This discovery prompted a change in which data should be mapped towards the sound design.

Prototyping

Physical Design

I designed the sphere and the electronic casings within Fusion 360. Then, utilizing transparent natural PLA, I was able to 3D print the spheres. The use of transparent PLA allowed for the lights which were placed inside the sphere to diffuse throughout the sphere, creating a warm glowing effect. More so, I utilized fading animations between states for the LEDs in order to create a smoother and natural transition between states. Each sphere would be placed on a standing pole where it will sit on a bowl. Within the edge of the bowl will be written text to prompt initial individuals to pick up the spheres and interact with it.

Hardware and Software

There were important changes which took place with the hardware of the prototype. I switched from utilizing the Arduino and moved towards the ESP Xiao C3. This was mainly attributed to its more integrated chip processing power and the ability to communicate through wifi more simply than the arduino. More so, with the unreliability of the radio frequency module, the goal was to move back towards wifi modules while creating a two way connection between the sender and receiver ESPs. To incorporate the visual feedback discussed in the design, LEDs were added to the list. There was limited space for electronics within the sphere. Thus, I chose these components mainly due to its size to ensure all the components fit cohesively within the encasing of the sphere.

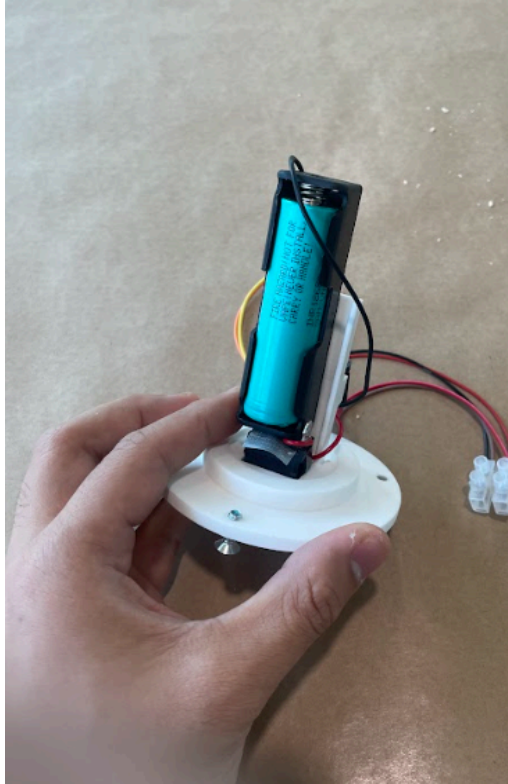




Figure 7.1 - 7.4. Visual images of the current state of the prototype

A comprehensive list of the hardware utilized in this iteration could be shown below:

Component	Description and Function
ESP Xiao C3 x 5 (Spheres)	<i>These ESPs will act as the main microcontroller utilized in this prototype.</i>
ESP Xiao C3 (Receiver)	<i>This ESP will be the receiver microcontroller</i>
WS2812B Leds	<i>Used to illuminate the spheres from the inside.</i>
18650 Battery & Battery Holder	<i>The rechargeable 18650 batteries act as the main power supply of the spheres</i>
MPU6050	<i>The MPU6050 is a 3-axis accelerometer and 3-axis gyroscope. The MPU served as the main sensor to detect movements of the people on the sphere</i>
Voltage regulator	<i>This step up voltage regulator boosts the 3.3V output of the ESP to 5V to power the LEDs</i>

Switch	<i>Incorporated to switch on/off the spheres</i>
Laptop	<i>The laptop acts as the main receiver of data which will process all inputs into a generative soundscape.</i>

Table 7.1. Component List

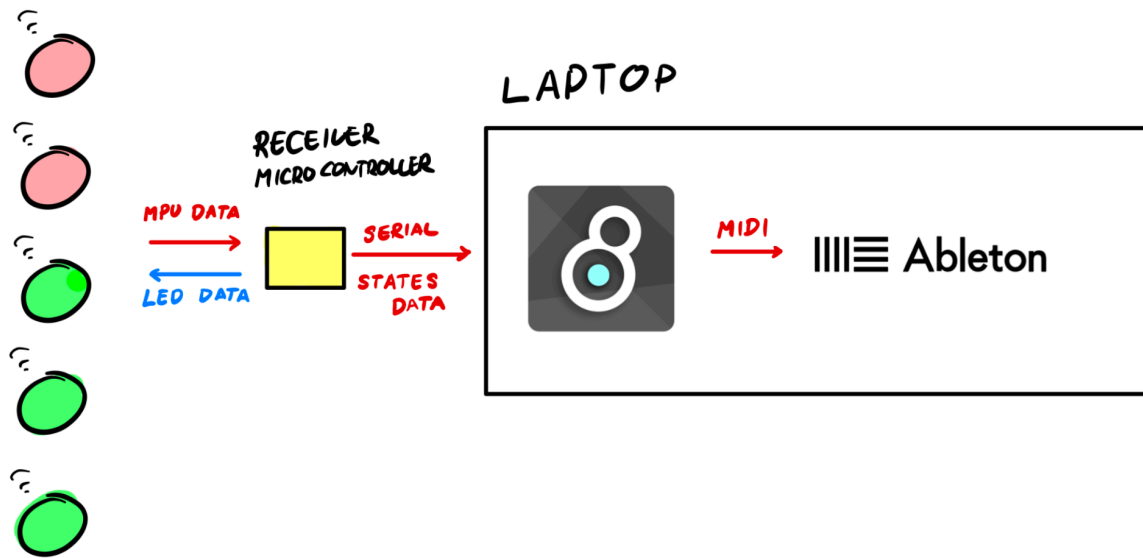


Figure 7.5. Flow Architecture

The software architecture of the system mostly remains the same. However MaxMSP is now used instead of TouchDesigner. This decision was made due to (1) the fact that Max MSP is a program which is tailored for audio prototyping, providing more audio related functions in comparison to TouchDesigner, and (2) it is also the program of choice of the sound designer (whom I will introduce in the next section). More so, data analysis is now processed within the ESP due to its higher processing power in comparison to the previously used Arduino. The receiver ESP will now send processed data to Max, ready to be mapped into MIDI information.

Sound Design

For the sound design of this iteration, I collaborated with a student from the HKU University of Arts Utecht named Vincent Van Der Geest. Given my limited knowledge on sound and music production, this provided a great opportunity for the both of us to create a more rich and appealing sound design. By playing around with polyrhythms, beat notes, and tempo, we allowed for multiple rhythms to occur simultaneously, creating a soundscape which sounds complex yet still pleasant to listen to. The rotation of the spheres would influence the note length on one of the polyrhythms. As more spheres are played, more polyrhythms begins to

have shorter note length while also increasing the tempo of the overall soundscape. Similar to the previous iteration, we used five different instruments, focusing on natural analog instruments while incorporating some electronic elements to create an enjoyable auditory experience.

<i>Polyrhythm Example</i>	https://www.youtube.com/watch?v=SthcxWPXG_E&t=166s
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Interaction Design

Person-Artifact Interaction

The spheres will light up the moment someone begins to either pick it up or rotate it. As they continue to rotate the sphere around, the user will be able to begin to notice the various rhythms changing in note length.

This interaction coupled with lights and sound provides a natural coupling which happens *in time*, in which the artifacts feedback and user's action coincides in time; or simultaneously (Wensveen et al., 2004). This un-delayed response could act as a feedback towards the user to prompt them to realize it is in fact *their* actions which triggers the sounds and the lights. This prompts the individual to explore their own interaction on how their movements influence the light and sound of the sphere they are holding.

Person-person Interaction

The sound design plays a crucial role in facilitating the collective experience. While the sound design can be seen to change once a person interacts with the artifact, the sound design enrichens as more people join the interaction. The first users will initially start with individual exploration, of the spheres. The interaction of the first individual with the sphere could then promote and encourage more people to join in into the interaction. The current prototype has been developed to promote social interaction and coordination while also promoting open ended exploration and play amongst one another. Through collective play, the people can collectively explore both the various colors and sounds the spheres make as they rotate either individually, together, or when they decide to sync up with one another.

Layers of Interaction

These interactions could be divided into different layers. These layers of interactions in which the people to *discover* a new aspect of the interaction while acting as a scaffold to promote the emergence of awe while increasing social interaction amongst the group. The first layer is the person-artifact interaction where a single individual plays with the sphere. Here the individual can discover how their actions shape the soundscape and color of the sphere.

The second layer could be described as social curiosity, in which if another person is present, they might simply be curious watching the iterating individual, prompting them to desiring to be part of the interaction. As they do, they will soon notice how their actions collectively begin to influence the soundscape, leading towards collaborative play.

The third layer could be described as collaborative play. Here, as more people join into the interaction, they can collectively explore the various interactions within the spheres with others. This in turn may lead to a honeypot effect where this open ended play (De Valk et al., 2013) might invite more bystanders, facilitating collective effervescence of awe and an embodied participatory sensemaking amongst the group.

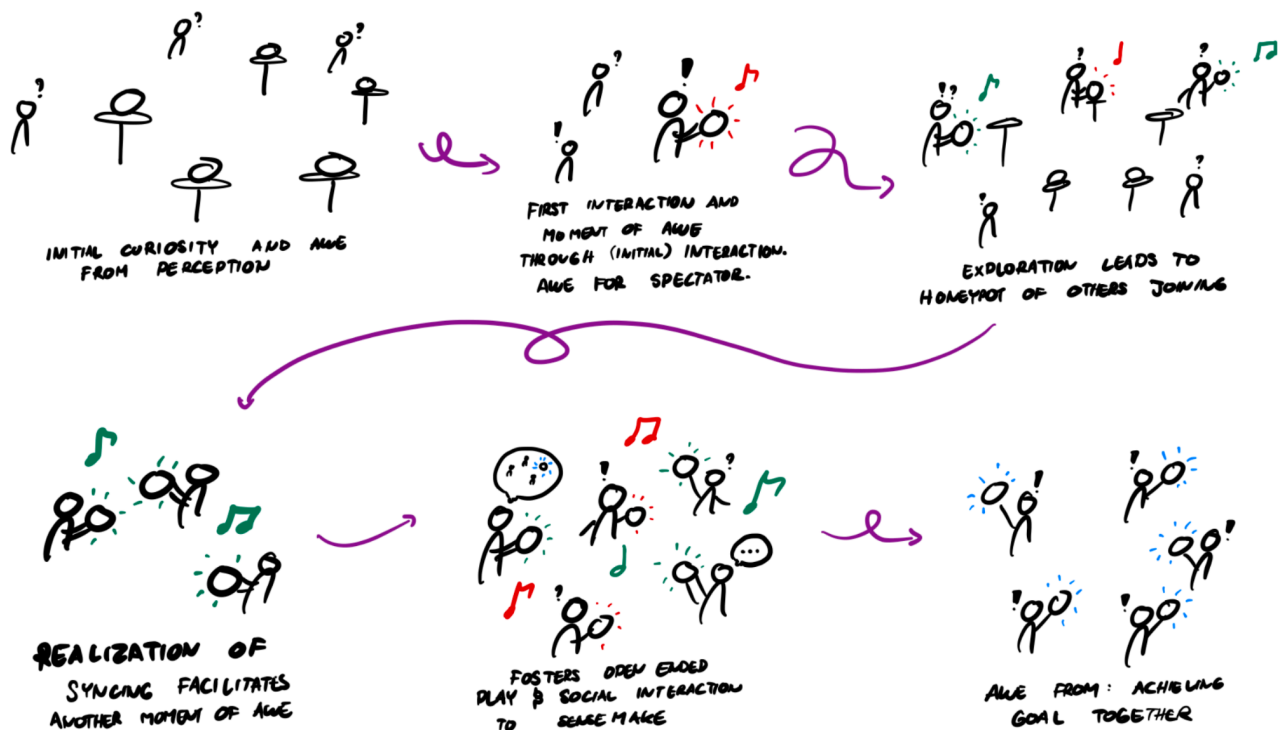


Figure 7.6. Envisioned Interaction Flow Iteration 3

Use Research: In-the-Lab & In-the-Wild

To test the current state of the prototype, two use research were conducted. One in a controlled environment; in the lab, and the other in a public space; in the wild. In the lab, we aim to understand and break down what makes the experience, by in a controlled environment and to gain insights into behaviors, the thoughts, and interactions of the users through a video recording of their interactions and a plenary group reflection.

The aim of the in the wild is to see the installation how people would interact with it in a natural setting while also observing if the phenomenon of collective effervescence and awe emerges from the interaction. Purely taking a more anthropological approach towards the research. More so, this would allow me to focus on pass-byers and strangers, allowing me to observe (if it emerges) the honeypot effect and the collective exploration within a group of strangers whom interact with the system.

Combining these two experiments will allow me to explore the effects of the prototype in a real-life setting in comparison to a laboratory. To maintain a understandable readability and flow in this section, I will first describe the methodology of both research set ups before presenting the results of each separately.

Methodology

In-the-Lab

The goal of this evaluation is to simply understand how the current state of the prototype invites people to explore and participate in a shared sensemaking, all while experiencing awe. This research utilizes two components, (1) an open ended bodystorming session where the participants, similar to the cocreations, will be asked to interact with the artifact and each other with minimal instructions (ie. They will be instructed to explore the prototype in an intuitive manner, no guides on how to interact will be provided). And it will also comprise of a (2) group semi structure interview (plenary session) in which we will reflect on their experience in interacting with the artifact together. From this I can gather valuable insight into the current affordance of the prototype, further understand the various person-artifact and person-person interactions, while also identifying key design factors for awe and collective effervescence. Audio and video recording will be made throughout the process of this use research.

In-the-Wild

The observation will happen in a public space with a lot of pedestrian traffic and will only make use of field notes; pictures or videos will be taken. It will focus on the visible signs of awe (such as shocked expression or verbal remarks), the interaction between the participants and the spheres, and the emergence of collective participatory sensemaking and collective experiences amongst the people involved. The study will take place in an open space to keep the results as natural to the real world as possible, as an experimental set up in a controlled environment would take people out of the real-world. More so, people will be free to interact with the installation as they please.

This observation will make use of ad-hoc verbal consent, which will come after the individuals have interacted with the installation during the debriefing. Observations which are included only

consists of those who have consented to being in the study. The field notes of the individuals who do not agree to partake in the study, or if consent was not possible (eg. the group left to quickly, they were just passing by, etc) will be destroyed immediately.

Results

In-the-Lab

The use study was conducted on the 27th of May 2024 with a total of five individuals. This group contains different individuals in comparison to the previous cocreation session. Thus, they have no prior knowledge of the installation, nor have they experienced it themselves. The installation was set up within a study room inside the DesignLab University of Twente. The video recording provided insights into the various interactions between the people of the session and the installation. The initial exploration lasted approximately 9 minutes. This session was video recorded in which helped in identifying the various observed affordances and interaction between the group and the installation.

More so, MAXQDA was utilized as an autotranscriber to assist in the transcribing process of the audio recording of the semi structured plenary session. This application was chosen specifically for its compliance with the GDPR regulations. This allowed for easier analysis of the plenary session. The session yielded a number of interesting results, these could be summarized into a table below:

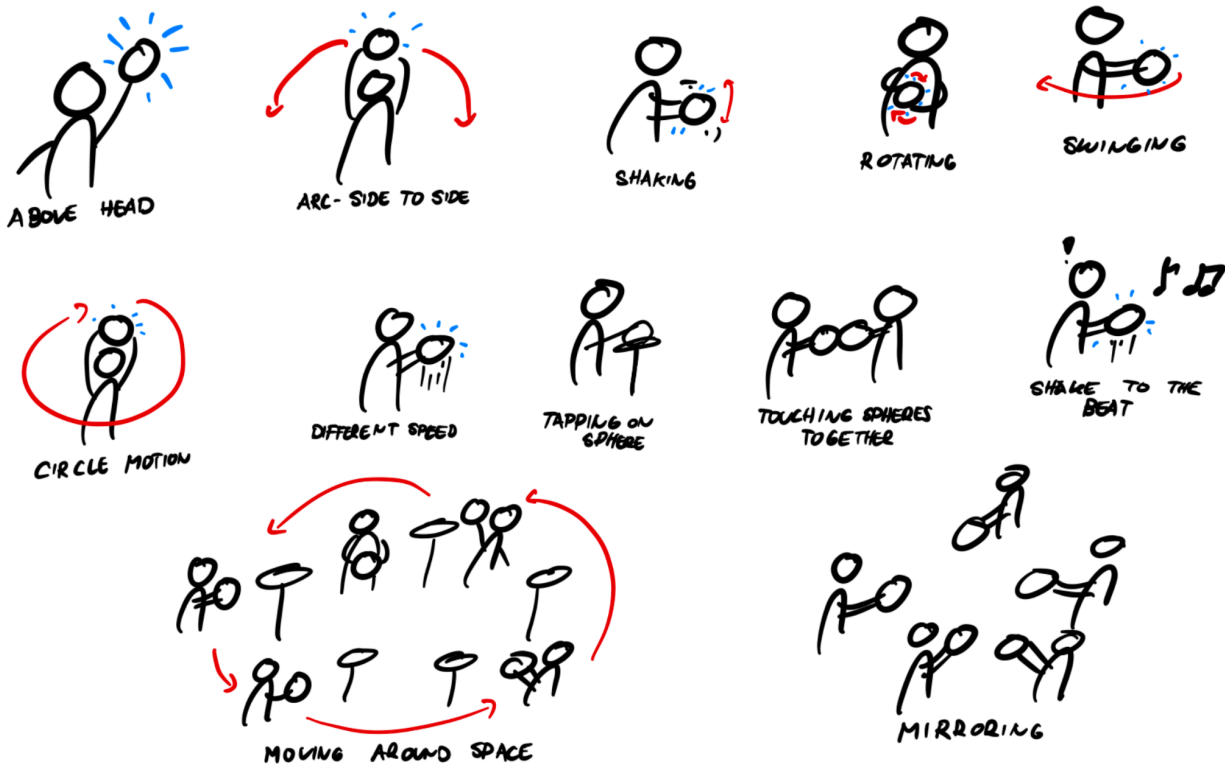


Figure 7.7. Observed Affordances and Interactions

This is table of people’s actions during the bodystorming:

Key observations	Description
Initial moment of curiosity	The participants were seen contemplating their curiosity as they looked towards the installation.
First interaction	There was visible curiosity and awe when the first person interacted with the sphere, lighting up and made sounds. People began to look at the glowing sphere and towards the direction of the sound.
Collective Joining into activity	As one individual continued to play with the sphere, the rest soon followed and began to pick up the spheres and explored various movements.
Visible and audible awe	People were curious of what others are doing and the interaction with their own (and others) spheres. Pointing towards each other when they noticed an interesting interaction and mentioning various comments such as: “Ooh”, “Oh Wow!”, “These are so nice!”

Actively looking at each other	The people were seen to constantly be looking towards each other while interacting with their own spheres, paying attention to each others comments, spheres, and interactions.
Social coordination amongst the group	“Maybe if we move it at the same time?”
Initial realization of synchrony	People seemed surprised when they saw that the colors of the sphere turning green. One individual made a comment stating: ”oh now we are in symphony!”
A moment of awe after social coordination	<p>During the exploration, the group tried to coordinate their actions together. And after collectively agreeing on the same movement, there was a moment of discovery when their actions led towards an outcome:</p> <p>*Group was initially playing with installation*</p> <p>Person 1: “wait everybody dont move!”</p> <p>*Group all collectively stopped moving the spheres and the sound and light faded away*</p> <p>Everyone: “Woah!!”, *gasps*, *laughters*</p> <p>*Visible and audible excitement and awe was heard and seen from everyone in the group*</p>
Excitement during a moment of discovery	There was visible excitement seen through the peoples collective facial expressions and verbal remarks as they either worked together towards an outcome or when they noticed something new within the interaction and the feedback (See Previous two examples).
Mirroring	Multiple times during the session, the group was seen to mirror each others movements naturally as they were trying to make sense of the interactions with the spheres.
Questioning various forms of interactions	<p>The participants were discussing amongst themselves about the various forms of interactions they could explore, making remarks such as:</p> <p>“What if they touch?”, “I think it moves differently if we move it side to side”.</p>
Imagining various use case	One of the participants imagined they were doing a Taichi session remarking: “Having a ball of energy”
Collective exploration and play	As the session continued the people were visibly seen smiling and coordinating their actions together.

Table 7.2. Observed Actions

After the exploration session, a plenary session was conducted to reflect on what they experienced throughout the prototype:

Key Reflection	Description
The unknown	The participants initially viewed the installation as an unknown artifact which sparked their curiosity. Not knowing what they are (and what they do) sparks curiosity amongst the group.
Levels of curiosity point	The participants suggested how there are levels to the curiosity: “I mean, at the beginning, it's these balls that you don't know what they are. So you're just curious. And then you see that they light up the light is the second curiosity point. And then there's music that I at least didn't expect it. That's super cool. ”
A process of discovery	The curiosity amongst the group prompted an exploration which turns into a process of discovering the installation: “It's all the process of trying to find out, how everything works” “When we picked it up and we saw that it made noise, I think like a lightbulb went off inside all of our heads and we were like, oh, if we move it, it'll make sound”
Collective exploration	One participant suggests the impact of having others also <i>join-in</i> to collectively explore the installation together: <i>“I think it's nice to be able to kind of hear the changes and also see the changes and then trying to make sense of it.</i> <i>But then you have to communicate with each other to kind of find out what, like ‘how, what do you think?’</i> <i>And I think that makes it more like an exploratory session... otherwise I would have picked up two by myself and just tried to like, you know, and now you just have to interact about it”</i>
Social Collaboration	The participants suggests how the installation acts as a scaffold for you to interact with the people around you: <i>“I think in a sense it's like you're trying to figure out how it works, but it's like I think the sound we kind of got, but then the light we didn't get. So it's like, because you don't fully understand it, you're like, I need to, you know, solve this puzzle. And then that's really like figuring out a solution is what drives the collaboration.”</i>

Circular design	In line with my design hypothesis, the participants suggested that the circular design and radial design helped with the fact that it is easier to communicate better. Everyone is turned inwards to face each other.
Multisensory Experience	The participants suggested that the most awe evoking aspect of the installation was its multisensory experience in the sense that it stimulated more than one sensory input. <i>“The fact that you move something and two other things happen, which is quite interesting”</i>
Fostering of social connectedness	<i>“I think we if we all picked them up and we didn't know how they worked, we would as a group try to figure out how it worked, even though even if we didn't know each other. ”</i> <i>“Youre working towards the same goal”</i>

Table 7.3. Key Reflection Points



Figure 7.8. Re-enactment of a group of people exploring the installation

In-the-Wild

The In-the-Wild research was conducted on the 21st of June 2024 in the Playground of the DesignLab of the University of Twente. This location was selected for its dark room ambience and high pedestrian traffic as it connects the entrance of the space to its various rooms and areas. The installation was set up in the center of the space where people can freely choose to interact with it. In total, two groups of people provided consent for their data to be used in this research. In discussing the results, I will categorize this as interaction one and interaction two.

Interaction 1	
Number of People Interacting	5 - 7 Individuals (taking turns)
Number of bystanders	3 Individuals
Duration of interaction	Approximately 10 Minutes
Key Observations	Collective exploration & moments of discoveries
Description of Interaction	
<p>In one of the rooms beside the installation space, a workshop was taking place. It so happens that the people attending the workshop had a break thus went into the area with the installation.</p> <p>In the beginning, people were seen visibly looking at the installation, looking as if curiously. One person decides to pick it up in a vertical motion (prompting no interaction and feedback), looking confused, they decide to place it down. Another person decides to pick it up and notices that it is through rotation that they produce sounds. Upon this discovery, the previous person alongside another decides to join in by each holding a sphere and rotating it. Now, three individuals are playing.</p> <p>There were moments in which the group stopped shaking the spheres and simply talked with the spheres in their hands, pointing towards each other and discussing the installation as they collectively explored it. As they explored, the main interaction visible was shaking and rotating of the spheres, one person even decided to pick up two spheres at once.</p> <p>Eventually, two other people decided to join in and a total of five individuals were playing. On the side, there was another group of people (three students not from the workshop taking place) seemingly paying attention to the group's interaction, talking to each other while their eyes were focused on the group interacting.</p>	

The interaction continued as the group changed composition as two individuals gave the spheres to two other peers. The group made different forms of movements such as shaking and rotating. Some individuals within the group were seen staring at others' way of interacting with the spheres, mimicking others movements.

A moment came when everyone's spheres for a brief moment turned blue, signaling that everyone was *syncing*. As this happened, One person pointed at the other's sphere (which quickly turned blue), mentioning how it changed into a new color with visible surprise and excitement in his voice and facial expression; as if seeing a new discovery.

During the debriefing, the group expressed their interest in the installation while mentioning how they enjoyed playing with it with each other and also acted as a "good energizer" during the brief break of their workshop.

Interaction 2	
Number of People Interacting	3
Number of bystanders	0
Duration of interaction	1 Minute, 1 Minute, 5 Minutes
Key Observations	Constant curiosity and desire to explore
Description of Interaction	
<p>In the beginning, one girl came to pick up the sphere in a vertical manner, the sphere did not recognize this gesture as a motion thus provided no feedback. The girl instantly places it back on the pole. Three minutes later, she decided to return and briefly explored it again on her own. Upon picking one of the spheres and slightly rotating it, the sphere began to glow red and produced sounds, she then decided to put it back and leave the space.</p> <p>After another five minutes, she returned with two of her peers and was seen coming towards the installation. They were seen talking then the girl was seen picking up the sphere (now seemingly more intuitively) and quickly her peers joined her. The group collectively picked up the spheres and began to laugh as they were interacting with the sphere. Some of them also began to dance while laughing. One of the individuals was also seen picking up more than one sphere at the time.</p>	

Table 7.4 & 7.5. Results of In-the-Wild Use Research

Intermediate Reflection

Insights from Use Research, Prototyping, and Theory

In this iteration, I managed to prototype hi-fidelity artifacts which can be explored with multiple people. Found both in the cocreations and also in both wild and experimental use study, the aspect of curiosity can be considered crucial in facilitating awe and collective effervescence. The aspect of curiosity and mystery comes hand-in-hand in, either creating a moment of awe for one individual or a group of people, while also having the potential to create a form of social connectedness as people want to try to explore and experience something together.

As mentioned in the results of the In-the-Lab research, the conscious decision to design for multiple users resulted in it acting as a scaffold for people, requiring them to work together in order to explore various forms of exploration. This is in line with the initial design insights we have seen in the beginning of the research.

During the beginning of this iteration, I decided to switch the mapping of the soundscape due to the observation of affordances of the sphere (which most likely changed because of the hi-fidelity prototype of the sphere itself and the introduction of the flat bottom which provides orientation in the vertical direction). Regardless, the affordances observed during both use research widely varied. It showed that each person initially reacts with the spheres differently, resulting in interesting forms of interactions. More so, the act of exploring promotes the emergence of various forms of affordances as everyone wants to try out all possible movements they can think of to discover how the system works.

From the experimental research, people believe that the most awe evoking aspect is the multisensory experience. In the case of the prototype, they had a physical sphere which they had to manipulate by moving. Which resulted in lights and sound. This is in line with what the people from co-creation said in regards to how awe should be convergent. It must focus all your attention into the interaction. Somewhat of immersion, however immersed in the experience of awe and collective effervescence.

Various forms of social coordination were also visible during the two use studies. This was observed through both their verbal and nonverbal behaviors. I observed how as the exploration progressed, people would show visible reactions of amazement and surprise as they looked at others interacting with the sphere, how they would mirror each other's movements, or even talk, discuss and coordinate their actions together through the exploration process.

During the interaction of the group from the experimental setup, I could visibly see a moment of collective effervescence of awe when I saw everyone shocked and realized the discovery they

made after a moment of coordination and collectively synchronizing their actions. It was a moment of discovery; A moment of sudden *awareness and realization* of a unique and special moment where a certain interaction is *unlocked* due to their social coordinated interactions. When reflecting, the participants mentioned that the installation offered layers of curiosity; in which it was a process or cycle of curiosity, exploration, and discovery; when either experienced alone or together. This layer of curiosity can be referred back to my previously proposed layers of interaction written earlier in this chapter.

From the In-the-wild research, I was able to observe a moment of curiosity not only from the users but also from a number of bystanders who seemed interested in the interaction occurring. As the installation already had five users, there was no more space for people to join into the experience. I can refer to my previous initial framework about how people can experience awe from watching other people interact. I can maybe reword this as not only awe, but also a feeling of curiosity which in turns invites people into the experience further prompting a possibility of awe; further facilitating the honeypot effect. From this I can deduce that awe comes in these moments and realization of curiosity which is another important design aspect which we should consider. Moving forward, it could be a suggestion to integrate more spheres into the installation, allowing for more people to take part in the installation at once.

Personal Lived Experience

Throughout the third iteration I tried to stay close to the phenomenon by exploring my own experiences of collective effervescence. This process made me more aware of the various moments I would see throughout my day-to-day life. Moments such as taking a simple picture together with friends, or being in the crowd and watching people finish the BatavierenRace 2024. I remember one of my friends saying, *“It’s so funny, we dont even know any of them yet we’re all cheering for them.”* in that moment I remember saying to myself: *“This is it, I am here experiencing this”*. This is exactly what I am trying to design for.

I made an effort to take this phenomenological approach, but ironically, even acknowledging, *“this is the phenomenon I am describing”*, is already a form of analysis, labeling the experience into *something*. I noticed this constant shifting between the experiential and analytical mindset throughout these iterations. Experiencing it allows us to capture the essence of the experience while analyzing it allows me to pinpoint the key factors we can use to design for it. It is ironic but it seems that this duality between experiencing and analyzing is necessary as it made it easier for me to design as I could both truly *know* what to design for while also understanding what I should be prioritizing.

Reflecting on my personal experiences and the process of this iteration, I have come to understand that awe occurs in moments of *something*. When we feel as if: *this is it*. I also saw

this in the use study when the group discovered something new in the interaction. Reflecting on my own experiences of awe, I found that these conscious moments of discovery or realizations are so sacred. It's that conscious moment when you realize that *wow this is such a beautiful moment*. Those *aha!* moments.

Closing the Iterations

In the first iteration, we have explored the design aspects important in evoking awe. In the second iteration, we explored social connection. And in the third iteration, we explored how to design for awe and collective effervescence. The process of the iteration helped me to develop my final prototype based on the various design experiments. More so, it taught me how to be more mindful and truly immerse myself in the experience of awe and collective effervescence. Throughout the process of the iteration, I could clearly visualize how my design, personal understanding, and lived experiences grew and evolved as I learnt more about the phenomenon.

The process of co-creation with other designers, working together with Vincent for the sound design and relating it back to past experience was essential for the process. It allowed me to gain multiple perspectives regarding the emotion of awe, while exploring the aspects of collective effervescence through various mediums; both in a theoretical approach yet also through our own lived experiences. From this I was able to identify a number of key factors on how we as designers focus on. The main important findings on to designing through awe and collective effervescence from all the iterations:

Key Factors	Description	Derived mainly from
Designing with bold feedback	Needs (extreme) contrast	Co-creation 1
Designing for collaboration	Must act as a scaffold for people to work together towards a certain goal	Co-creation 1
Design for collective play	This builds up on the previous point, it must be an open ended play. Must need more than one person to do so.	Co-creation 2, Use Research (Lab & Wild)
Attention to detail	Every aspect of the design must make sense; even the smallest of details	Experience Mapping, Co-creation 2
Visual and tactile	Participants described awe to be a tactile manipulate in real	Experience Mapping Co-creation 2

	world; but also a visual	
Focused convergent	This is what they mean by all attention is focused on the interaction	Experience Mapping, Co-creation 2
Being able to see each other is key	People need to be surrounded by others	Personal Lived Experience, Use research (Lab & Wild)
Layers of curiosity and discovery	These layers of curiosity could lead towards a form of exploration which often ends up with a <i>discovery</i> .	Prototyping 3 & Use Research (Lab & Wild)
Facilitating <i>the moment</i>	Directly building up on the aspect of discovery, we should facilitate this moment of <i>aha</i> or <i>this is it!</i>	Personal lived Experience, Co-creations, Use Research (Lab)

Table 7.6. Key Design Aspects

These design aspects emerged from the design process and the experiments which were conducted throughout this research. Inspired by the theories, existing works, and also lived experiences of both myself and other individuals, these design aspects were determined from a bottom-up approach where insights arose from reflecting and iterating on the design and my understanding of the phenomenon.

Throughout the process of the iteration I was able to design an interactive installation which tries to encapsulate all the design choices we have learned so far, in order to facilitate the emotion of awe and collective effervescence. The final installation is entitled *You are Here*. It is the physical example of an installation which tries to facilitate the emotion of awe and collective effervescence through a tangible interaction and social connection.

Chapter 8: You are Here.

You are Here. is an interactive installation aims to foster collective exploration and connection through evoking the experience of awe and collective effervescence. It is an audiovisual interactive experience in which awe could be experienced collectively through curiosity, discovery, and open ended play, further creating a moment of collective effervescence amongst the audience. Although the main interaction happens between the individual and the sphere, the real interaction happens between people as it acts as a medium for people to connect, explore and discover, facilitating and fostering an emotion of awe and collective effervescence.

The installation consists of five spheres which are then placed on top of wooden poles in a circular layout. To accompany this, a main speaker is located within the center of the spherical layout which produces sounds if a person interacts with one of the five spheres. The installation only has one instruction: *"Pick me up!"*, written on the base of the pole which acts as an affordance for random pass-byers to pick up, interact, and explore the spheres. As one person picks up and interacts with the sphere, it will begin to light up in red and sounds are then generated from the center of the circle.





Figure 8.1-8.3. You are Here.

This initial interaction is meant to act as the first stage of curiosity and discovery, prompting more exploration between the individual and the sphere. If more people are around, they could begin collectively exploring the various spheres together with the first individual acting as a scaffold for others to join in on the experience. The moment two or more individual's sound syncs up, you can start to begin more rhythms being played and the spheres which are syncing will begin to slowly fade to green. And stopping will make it not sync and the spheres will fade back to red or off if it is not being used.

The moment all five spheres are being interacted with, the spheres begin to shine blue indicating a form of unison amongst the group all together while a collection of polyrhythms plays adding to the beauty and chaos of the soundscape which the group is generating together. The installation fosters this sense of open ended play and collective exploration in the sense that it facilitates people to interact with each other, coordinate their actions to *figure out what is going on*, and further collectively experience the installation.

Within the main concept, the installation could be placed within a public space where various strangers could come together to explore various forms of interaction either alone or together, prompting others to join in and experience stimulating the honeypot effect. This installation aims to embody all the various key design insights that I have learnt throughout the various iterations of this research.

The initial concept began with a sphere as it provided various affordances for multiple interactions. The affordance does not only allow for one person to interact but invites other forms of movements such as throwing, tossing, shaking, and many more. However, through the process of the iterations, the shape of the sphere was changed to have a flat bottom. This meant that the shape of the artifact is no longer a full sphere rather more of a dome with a flat bottom. This major change can be attributed to the sensor utilized within the system. As the installation is using an accelerometer, it was important to identify the relative XYZ components, however this was not possible in a sphere. The addition to the flat bottom gives it one form of orientation, Up. With this not only can the sphere lie on one of its sides, but it provides people with a direction on how the sphere should be held. This provides a vertical orientation both to the placement of the sphere but also on how individuals would hold and interact with the sphere. However, this was not the only major development of the artifact.

From the co-creation I learned the importance of extreme or bold feedback. This was incorporated in the design by providing distinct feedback when an individual is interacting with the spheres. More so, the various co-creation sessions revealed an important component of awe and collective effervescence in interactive installation: collective exploration. Throughout the sessions it was seen how curiosity would be sparked amongst the group as they tried to understand the installation. This installation facilitates this collective exploration by

incorporating various affordances with visual lights and various polyrhythms which encourages the participants to share a moment of exploration together, creating a moment of participatory sensemaking amongst the group. More so, this was made possible due to the current design as it requires more than one person to fully experience. This led to various interactions and ultimately discoveries.

From the bodystorming exercises and the use of evaluations we saw how people showed visible signs of awe during moments of discovery with the installation. Awe was always experienced when people figured out or realized that something new was happening or they found out how something works. From this insight alone, the installation was designed to have multiple layers of discovery where individuals could collectively interact and discover new aspects of the installation if they work together. The various affordances such as the spherical shape, the glowing lights and the central speaker provided the system with various angles which could spark curiosity amongst people.

The spherical set up with the sound coming from the center places the focus of the attention inwards instead of outwards. This prompts people to face to the center of the sphere focusing on the sphere and the people around them. This aspect of being able to see each other and notice each others' presence plays a crucial role within the design of this installation. *You are Here.* is an interactive installation which resembles my physical manifestation and hypothesis of how we as designers and researchers can design through awe and collective effervescence.

Chapter 9: Discussion

Answering the Research Question

Throughout this research, I have observed how the research question evolved significantly throughout the different iterations due to the new knowledge and experiences I have gained. This is part of Research through Design where we reformulate and reiterate on the focus of research questions as the study progresses (Zimmerman et al., 2010). The focus on the phenomenon being studied became sharper leading towards a refined and detailed research question that aims to encompass the phenomenon. In this section, we will discuss the answer to the final research question in a detailed manner. The final research question is as follows:

How can we design for the collective effervescence of awe through interactive installations?

Refresher on the Initial Framework

In the beginning of this research, I presented the initial framework in which awe could be experienced in an active and embodied way through movement and collective collaboration. Within that previous framework, I elaborated on the importance of collective movement while also hinting at the honeypot effect (Wouters et al., 2016) and the experience of which emerges from collective movements and participatory sensemaking (De Jaegher & Di Paolo, 2007). More so, here we see the importance of an active experience in comparison to a passive experience. I have described how awe could be considered an active experience which emerges through the interaction, further acting as a social scaffold, evoking the shared experience of awe.

I paid attention to how there was a connection between the concepts of collective participation when designing for awe, and participatory sensemaking & social coordination, further suggesting how these concepts provide the main *clue* to understanding how awe is an active and also a collective experience which emerges through the interaction. In the later stage of the research, we have seen how this collective experience of awe can be described as a form of collective effervescence.

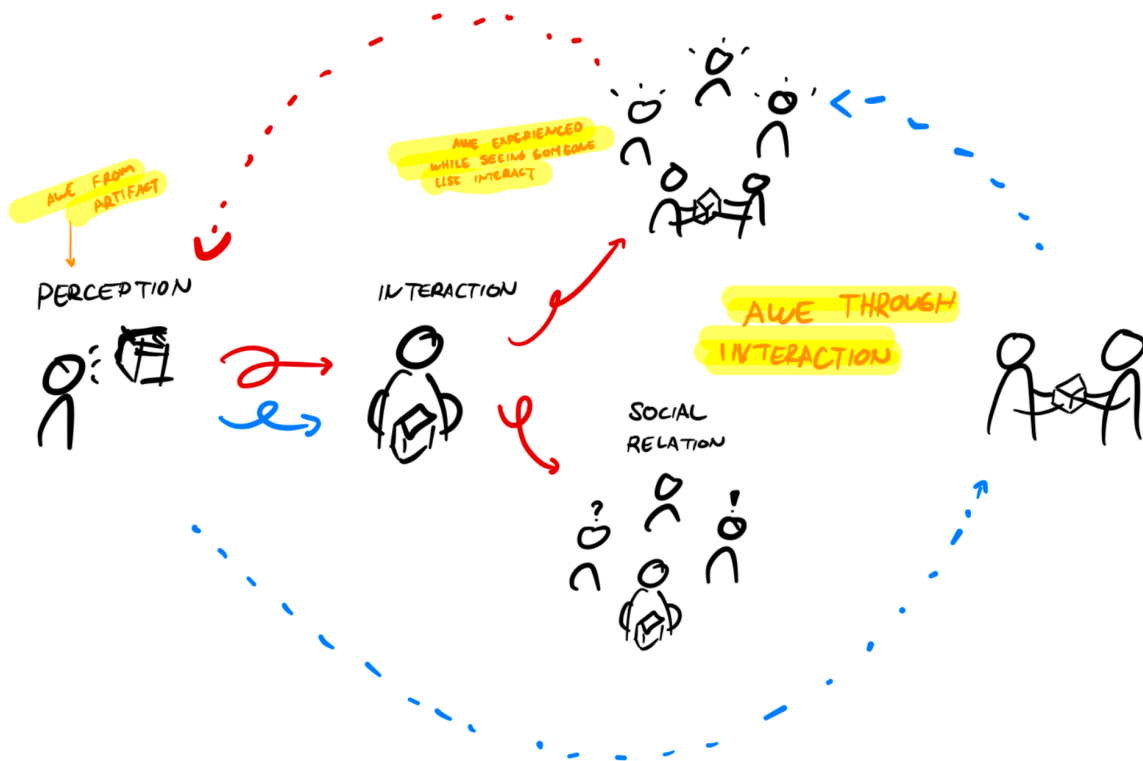


Figure 9.1. Designing through awe and collective effervescence framework: Awe through interaction loop

Although the initial framework provides insights to the various stages that awe can occur it does not go into detail on *how* we can design for one or the other stages or interaction. The process is missing, this is where the design experiments come in. The goal was to design an installation which had an active embodied tangible installation while also promoting a sense of social connection as a criteria as we are trying to explore collective awe experiences in interactive installations. Now with a brief refresher on the initial framework and also the insights we have gathered through the various design experiments we can address the main research question of this exploration.

Reflecting on the Initial Framework

We will combine what we have learnt through the initial framework with the insights we have gathered throughout this exploration. The results of design experiments have shown that it is indeed inline with the preliminary framework, further suggesting that awe is an embodied and social experience. However it also suggests that the framework is still incomplete ,as it only provides insight towards how the phenomenon arises, and not how to design for it. Here we

will continue to build upon the framework as we answer the main research question through reflecting on the framework and introducing new design considerations into the framework.

We have discussed the importance of active experiences in comparison to passive experiences. In a passive experience, the user is presented with the experience of the installation and their interaction does not play a significant role towards the overall experience. However, in an active experience the user is encouraged to interact with the installation or the people around them, more so it is only *through* this interaction and participation that the experience emerges. The key difference between a passive and active experience would then be the involvement and the participation of the individual within the overall experience that they create. Thus, as previously suggested in the beginning of the research, the conscious decision for the installation to be made *for* collective use is a prerequisite. Some questions which could help include:

Questions	Description
Does the installation work without human interaction?	Does it still run even if no one is interacting with it or must there be a person for it to work.
How important is the individual's action towards the installation?	Does a person's interaction manipulate the installation or does it unlock a certain level of new levels of interactions which can only be available if somebody interacts with it. In other words, how do people's interactions influence the installation and does it work towards something or is it simply a change in gestures and control; what does it try to evoke?

Table 9.1. Guiding Questions for Collective Use

We can relate this to the phenomenon of collective effervescence where these ecstatic emotions (such as awe) are experienced through active participation such as in rituals, gatherings, and festivals. This alone is a phenomenological proof that awe is an embodied and social experience. As previously mentioned in the beginning of the research, collective effervescence was discovered in the middle of the research, thus it was not incorporated into the initial framework. The question then lies in how does collective effervescence fit into the current framework of how awe could be evoked through an embodied social experience?

In their work, De Jaegher & Di Paolo (2007) builds upon the theory of enactivism which suggests that knowledge is generated through our interactions in the world, which includes social interactions. Collective effervescence is a social phenomenon which involves the participation and interaction between two or more individuals. Collins' (2004) work on interaction ritual chains suggests that social interactions which could be considered as *rituals*, where taking part in these rituals acts as a pathway for collective effervescence and awe (and other heightened emotions) to occur. The Interaction Ritual theory helps ground the framework within a social context, further hinting at how the phenomenon arises.

Although theories like Interaction Rituals provide us with insight on how people interact with each other on a behavioral level, yet in general these studies are more concerned with the social phenomenon rather than the individual's experience (De Jaegher & Di Paolo, 2007). Even though we can experience awe through collective effervescence, awe is still an emotion felt by each individual person, it is an individual experience. This point was also raised during the second cocreation where the participants suggests that ultimately, awe is an experience that everyone feels *individually* even if we are all feeling it at the moment, further grounding the idea that even though in a social context, we take a first person perspective in our own experiences of being embodied in the world (Van Dijk & Hummels, 2017).

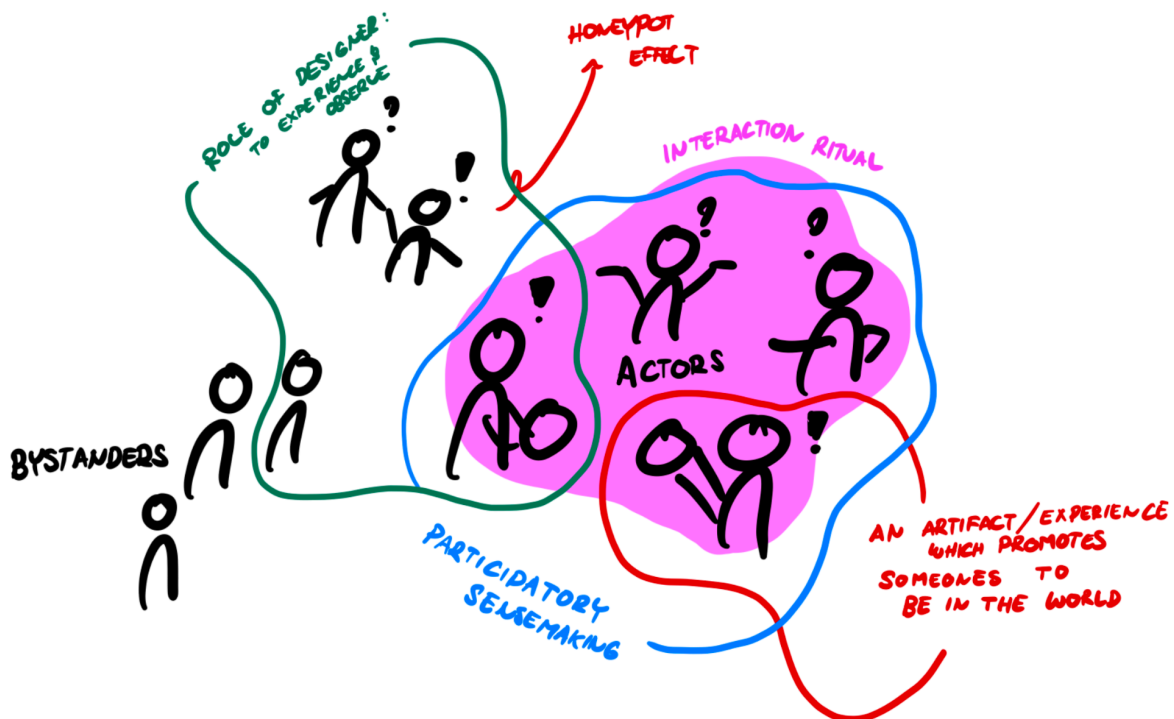


Figure 9.2. Designing through awe and collective effervescence framework: relations between theories when designing for the collective effervescence of awe

While the works of Van Dijk & Hummels (2017) provide insight to how we can enable an individual's personal embodied sensemaking through artifacts, (Collins, 2004) begins the situational context and the social phenomenon. Participatory sensemaking describes how in between two of these lenses, people try to make sense of their interaction together through a form of coordination and share attention. Within the context of this research, this is all mediated through a design or an artifact. Within this context, the design acts as a focal point for the interaction, acting as the *sacred object* of the interaction rituals (Collins, 2004) and the focus of attention & activity for the group of people involved (De Jaegher & Di Paolo, 2007).

Design Considerations

The process of this exploration has allowed me to identify *clues* on how we as designers can design for facilitating this phenomenon. There are a number of design considerations we can discuss when we are trying to design through awe and collective effervescence. These design considerations include the use of (1) bold feedback, (2) convergent focused attention, (3) being surrounded by people, (4) collective play, (5) layers of curiosity and discovery, and (6) facilitating *the moment*. In the next few subsections, I will briefly discuss each component.

Bold Feedback

According to the results from the co-creation it is important for us to ensure that the designs have contrast. Some participants mentioned that the emotion of awe makes them feel very small or in contrast very large. This extreme duality is important and when translated into the realm of an interactive system, we can consider this as having extreme feedback or controls. This entails that the system being designed must have very distinct output when it receives a user input. We can relate this to Ke & Yoon's (2020) fifth strategy of designing for awe through *rapid changes and unpredictable behavior*. Through rapid changes and unpredictable behavior it is possible to create a sense of vastness which could overwhelm the individual. Yet the bold feedback which is uncontrollable might seem ambiguous, not providing a *clear* indication of what it actually means.

In reference to *You are Here*, simple movements provided feedback in the form of colors and dynamic sounds. Although bold, they are also ambiguous. Ambiguity is seen as a negative aspect in HCI, however ambiguity could be viewed as a positive feature in the design as it allows for personal experiences and personal interpretations, as meaning is then not *predefined* by the design (Gaver et al., 2003). In this sense, it is important for us to create distinct feedback for the individuals experiencing the installation with a certain level of ambiguity, allowing the emergence of curiosity and individual interpretations to occur.

Convergent Focused Attention

The key to convergent focused attention is to design an experience which fully immerses the individual into the interaction. The goal is to focus all of the individual's attention into the

interaction. Often this could be done by having a 360-degree room which encapsulates the individual into the immersive experience (eg. *Touch* and *Autonomous Abstractions*, found in Chapter 3). However if the installation does not use for instance, a screen, how do we then immerse them within the experience? The answer to this question is to create a multi-sensory experience. As suggested by the user evaluation, the participants found the most awe evoking factor of the installation to be the aspect of multi-sensory experience.

This entails a number of things. (1) It is important for us to pay attention to the tiniest details when designing. This entails that the designer must ensure that every design decision (whether shape, material, feedback, texture, interaction) must make sense and fit into the greater picture of the installation; creating a congruent story. (2) Here we can also argue that affordances play an important role within designing the installation. We should strive to design interaction around the affordances of the artifact in order to facilitate intuitive interactions between the individual and the installation.

Up until now we have only discussed convergent focus attention of one individual towards the installation. However we can also consider the convergent focus of attention of the group towards the same installation, experience, or activity. When designing for the collective effervescence of awe, it is important for us to ensure that the users focus on their interaction with the installation and also the group around them. Their focus is thus expanded from just an individual interaction to a collective interaction. We can relate this to the theory of participatory sense-making in which everybody's attention converges to a single point (activity or context) as they collectively try to make sense of their experience through a focused attention which converges towards one point of attention.

More so, In his book *Interaction Ritual Chains*, Randall Collins (2004) describes this focused attention as an important aspect for facilitating collective effervescence. He states: "As the persons become more tightly focused on their common activity, more aware of what each other is doing and feeling, and more aware of each other's awareness, they experience their shared emotion more intensely, as it comes to dominate their awareness" (Collins, 2004). Within this context it is then important to not only immerse the individual into the experience but also make them aware of each other's presence and their shared activity.

Surrounded by people

Being surrounded by people is an important aspect of the collective effervescence of awe. I argue that being surrounded in a sea of people is crucial for people to know that they are part of something larger than themselves. It has been shown in multiple studies how awe acts as a pathway towards social connection (Chen & Mongrain, 2021). To design so that people could be surrounded by others, it is important to consider a number of aspects. First being the actor (person who decides to engage with the installation), and secondly the bystander (people who

are watching others interacting with the system passively). It is important for us to be able to address both.

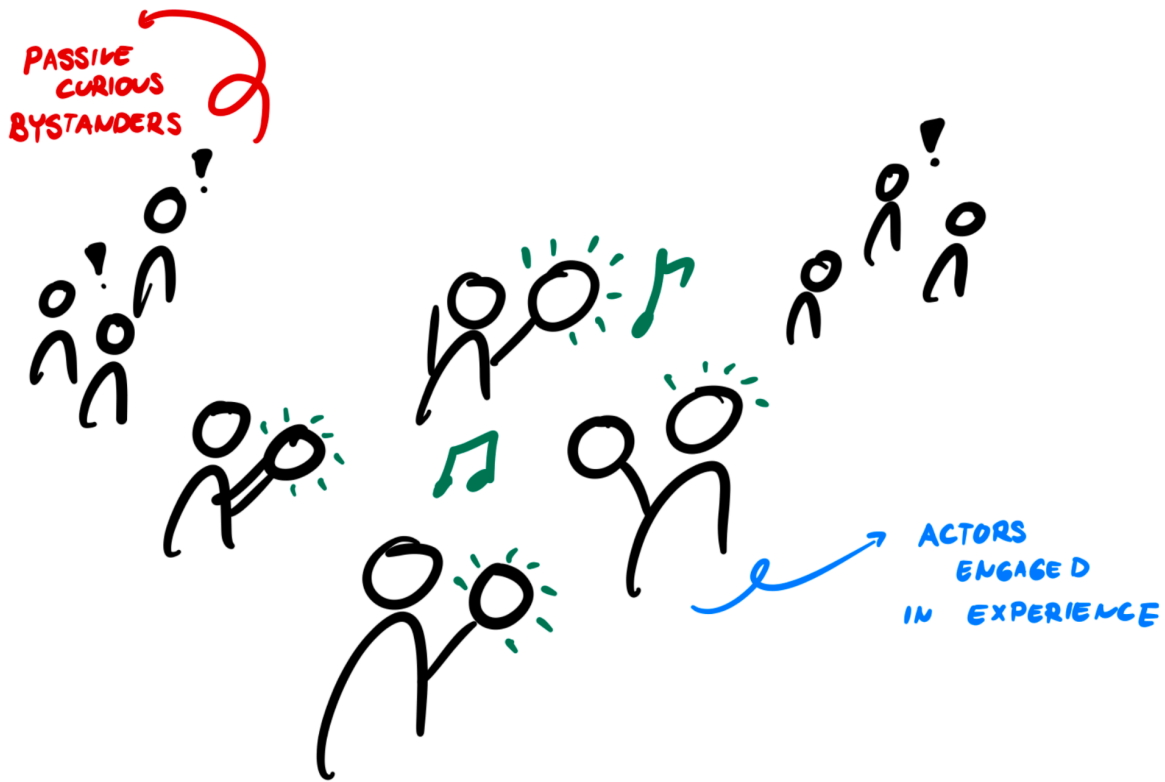


Figure 9.3. Bystanders and actors in an experience

We need to make sure that the people who are interacting have enough room for others to join in but at the same time we also have to have enough viewers in order to create this honeypot effect. Here it is important for designers and researchers to think and consciously make the design choice so that multiple people can interact with the system at the same time; while also reducing the barrier of entry of the bystanders.

This could be done in a number of ways, for instance you could have a large space which can accommodate multiple people thus inviting and allowing the installation to be interacted with by many people at once. Here we can take the example of the installation *The Pool*, consisting of many circular disks placed around a large space, the installation provides a large surface area for which multiple people can come together and interact with the installation. This results in a huge crowd of people converging into the space creating the feeling that you are surrounded in a sea of people.

We could also use proximity to our advantage. In the installation *Wish Happiness*, The small carousel attracted a large audience to converge into one small installation in comparison to *The Pool*. However, this convergence amongst various individuals focuses all their attention into

one object, providing the feeling that everyone is in a crowd focusing on the experience. The third way we could provide people with the impression that they are surrounded by others, is to leave traces which entails that the installation builds upon the input of multiple users. Here we can take the example of participatory installations where the art develops over time based on the various inputs of the individuals.

Within the context of the installation *You are Here*, a centralized speaker which was placed in the center of the installation created a focal point, directing every body's body position inward further acting as a scaffold for everyone to look in to the circle, thus facing each other, opening up possibilities for social interaction and collective play.

Collective Play

Collective play acts as one of the most essential design factors that we need to consider when designing through awe and collective effervescence. Here we should ensure that our design fosters this aspect of open-ended play allowing people to collectively explore, interact, and play with the installation together. With this in mind, it is important that the designer makes the conscious decision to design *for* multiple users; further thinking of ways how each individual which interacts with the system builds upon the interaction.

The act of collective plays gives way for participatory sensemaking where the collective exploration creates a feedback loop of a collective reflection in-and-on action. Here, it is not only the individual who is reflecting, but a group *consciousness* who acts together and reflects on their interaction within the system together. Here we can reference Ke & Yoon's (2020) principle of *Active Participation in a Collective* where people work towards a common goal through a participatory activity (De Jaegher & Di Paolo, 2007). This form of collective play could happen in multiple ways, such as a form of situated social play (Morrison et al., 2011) in which the group can engage through the installation, utilizing the medium as a proxy for social interaction and forms of collective play emerges as the result. Here, the installation must act as a scaffold for social coordination (Van Dijk & Hummels, 2017).

The group could also play with the intention to make sense of the installation and their interaction; further working together to understand the installation conceptually and technologically. This form of play is known as speculative play (Morrison et al., 2011). This form of play could clearly be seen in the various co-creation and use evaluation as the various groups collectively collaborated with each other to understand and tried to make sense of their interaction with the installation. These forms of collective play provide a path for the group experiencing an installation to experience layers of curiosity and discovery which could evoke the phenomenon of the collective effervescence of awe.

Layers of Curiosity and Discovery

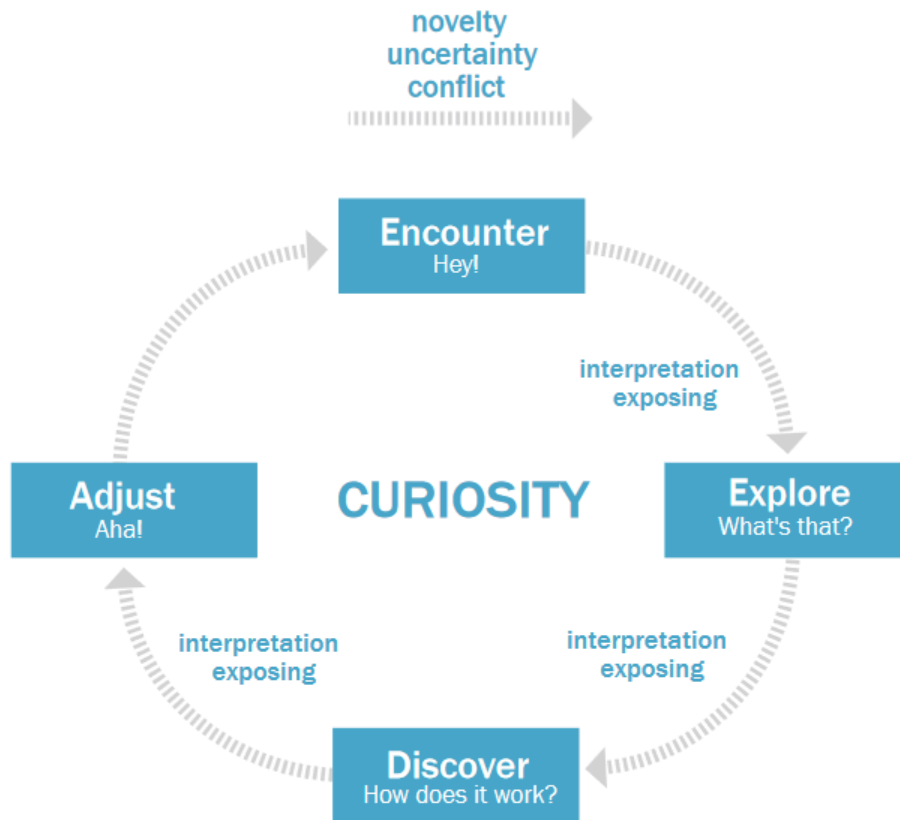


Figure 9.4. Curiosity process Adapted from: (Tieben, 2015)

The installation must mediate for curiosity and discovery which allows the individuals to collectively explore the installation together while making sense of their interaction. These layers act as phases towards the interaction where the more a person or a group explores, the more they could understand the installation, learning and discovering a new aspect about the interaction as they play. This was seen evident in the use of research where the participants mentioned that the layers of curiosity prompted them to continuously explore various interactions with the spheres and with each other.

Participant Journey Map

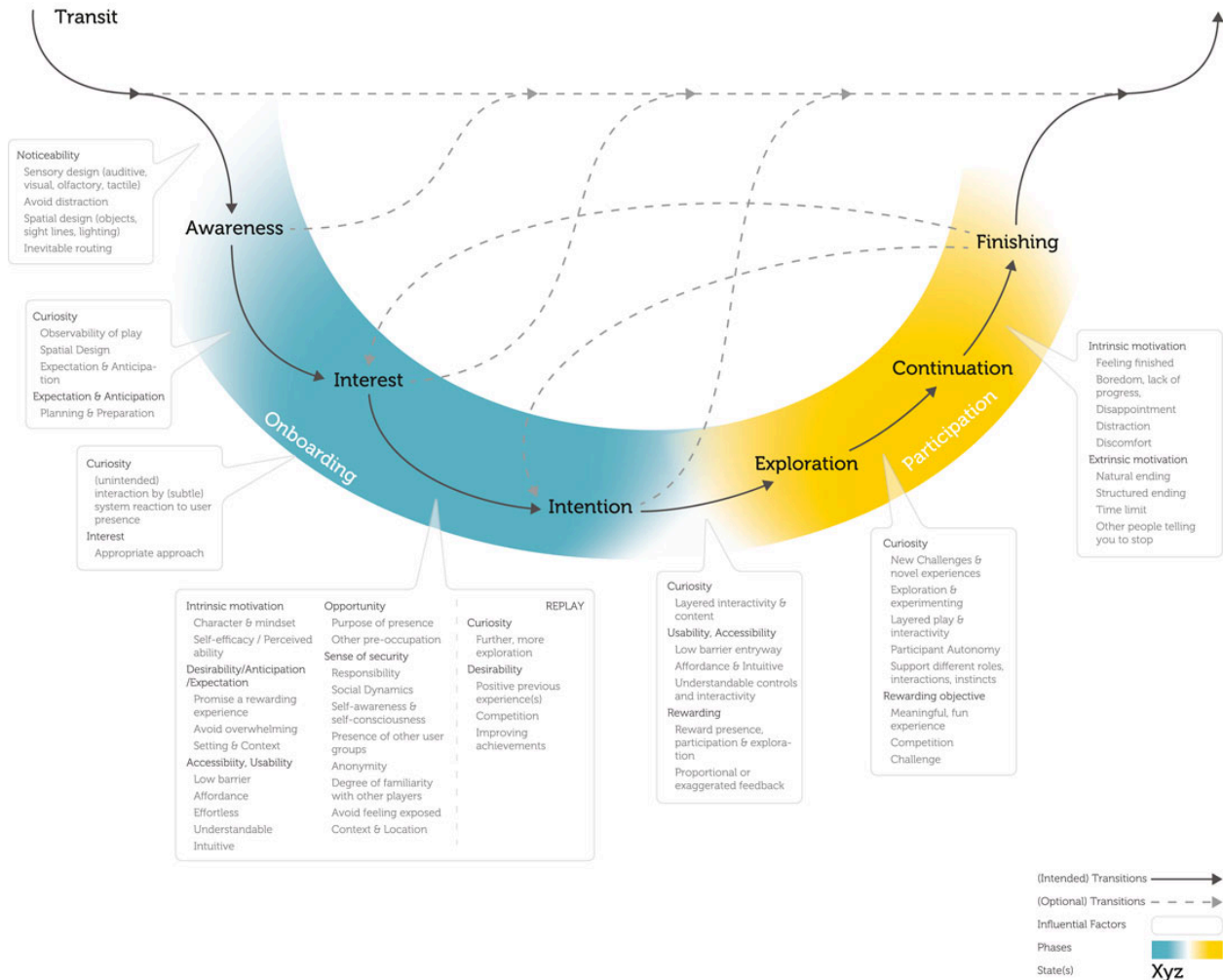


Figure 9.5. Participant Journey Map; adapted from Mast et al., (2021)

It might be the case that we struggle to design for these layers of curiosity and discovery as we are unsure of how the individual will interact with the installation; It could be the case that the scaffolds are not clear enough, leading to a high barrier of entry or if their curiosity is met with disappointment due to lack of distinct feedback. One method to tackle this includes experience maps (such as in chapter 7: Layers of Interaction) where we note down the various key interactions the user will have with the installation. We can then build upon this by relating it to the participant journey map (Mast et al., 2021) to further identify the key interactions and moments in which we can design for. By identifying these key interaction moments, we can prioritize moments where we should design additional scaffolds to spark curiosity and discovery amongst the users.

Facilitating *the moment*

Facilitating *the moment* connects back to the previous point of a moment of discovery. Here we are talking about the collective conscious realization and sensemaking amongst the individuals that something grand is happening (or has happened). I believe this is one of the most important aspects in designing for (specifically) collective effervescence. Ironically, I believe this is the hardest design factor to verbalize into words.

We are talking about that moment when we realize: *This is it!* And to add to that you also realize that others are also experiencing the same thing. It is that build-up towards a moment and then the moment itself. Think of it as *The Defining Moment*. Here we can think about climaxes of a story, or the *drop* in music. Think about the moment when the opera singer reached the highest note. Or a moment of celebration after a penalty kick. These climaxes play an important role in a successful interaction ritual chain (Collins, 2004). These climaxes can happen both formally; which is achieved by “deliberately orchestrated moment of focus, entrainment, and collective effervescence that unites large groups” or naturally; where “pleasurable outpourings of shared emotion in which crowds of entrained consumers generate social atmospheres spontaneously, without leadership or orchestration from firms” (Hill et al., 2022).

We can facilitate ways in which climax might arise within the collective interaction. Here we should think of ways in which the installation could build up into a moment, for the case of an audiovisual installation, it could be a *drop* in which the soundscapes and visual component could change dramatically or to allow the moment to occur naturally through ways of collective play. The key is to make people realize: *This is the moment*. To do this, we can consider a number of key factors.

(1) We can design to create anticipation. It is through this buildup of an expectation that people can *look forward* towards something happening within the interaction. An example of this would be from the *Use Research* when all the participants asked each other: “*Wait dont move!*” And the participants collectively worked towards this goal while *anticipating* a form of outcome. As the sounds dissipated, people realized that their actions influenced the soundscape creating a moment of discovery and awe as they all expressed audible and visible awe.

This brings us to our second consideration, (2) a mutual understanding through participatory sensemaking must be made. In this case the moment has to be bold and distinct enough so that everyone can recognize it. The perfect example of this would be the installation *Touch* in which the act of physical touch between two individuals creates a vast display of colors and lights, immersing the individuals, capturing the essence of a simple touch. It focuses on a specific moment and amplifies it, creating a moment of climax during this simple physical touch.

From a framework to an experience

To further visualize how these various design considerations can be implemented into a design, I want to refer back to *You Are Here*. within the context of this section.

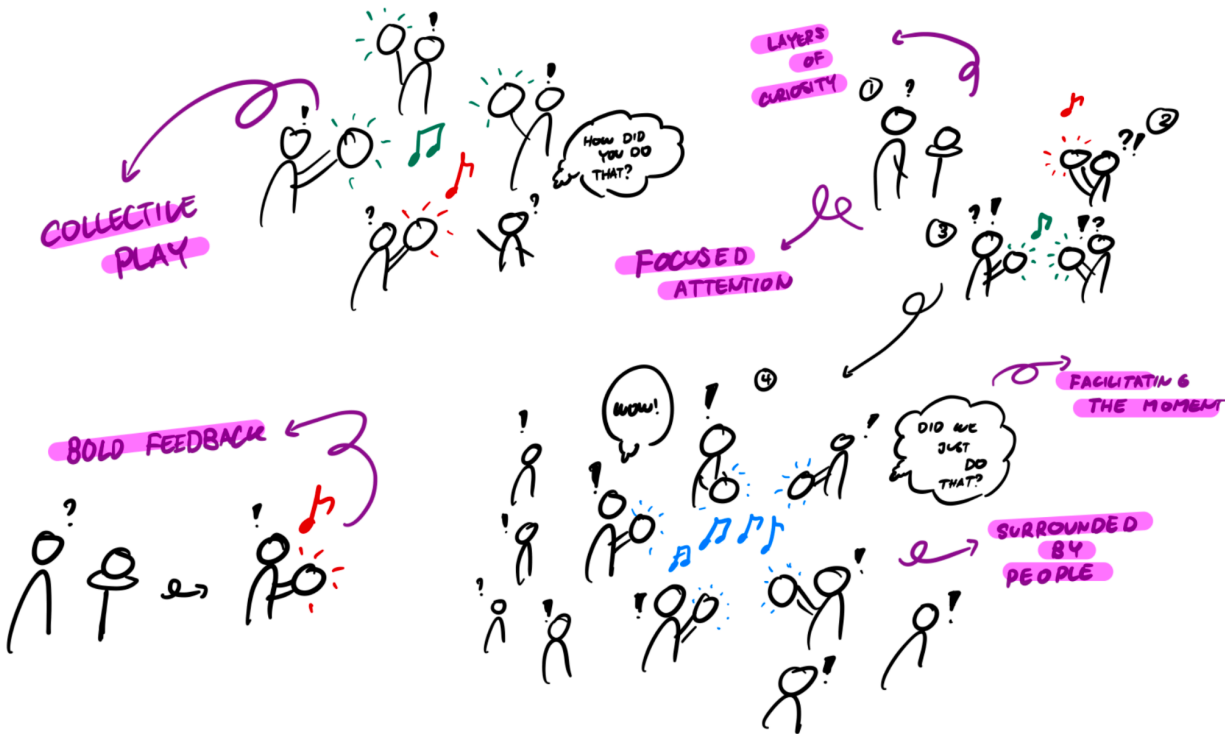


Figure 9.6. Design Considerations in *You are Here*.

Taking a look at the picture above, it is clarified how each of these design factors played a role in the final design. It is important to note that not all these features are mutually exclusive, rather they build upon each other as shown clearly through Figure 9.1.

The initial framework provided a roadmap on how awe could emerge through interaction. Through the design experiments and experience mappings, we learnt the various key factors we should prioritize when designing an installation with the aim of evoking collective effervescence and awe while also putting emphasis on personal lived experience and how it influences the design process. Through combining theories and also various design experiments, we were able to identify key design guidelines and gain a deeper understanding of the phenomenon being addressed. This framework serves as a guide for us designers and researchers to create moments for people to connect together and play to create these moments of collective effervescence and awe through interactive installations as the medium.

Designing through Awe and Collective Effervescence in Interactive Installations

Design Contributions

In this section I aim to explain the contribution of this exploration to the scientific and the design community. As far as my research indicates, this thesis is the first to explore how to design for collective effervescence. A search in the ACM database on collective resulted in minimal results. It is possible that other researchers have attempted similar exploration under different terminologies, such as syncing, shared experiences, etcetera. However, as the term collective effervescence was identified during the process of this exploration, no proper literature review into this concept within the HCI field was done during this research.

Contrary to the concept of *designing for* [concepts (eg. open ended play, accessibility, synchronicity, etc)], I suggest that this thesis aims to design *through* it. Awe and collective effervescence is not only something we design *for*, it is also a phenomenon that we design *through*. Here I am speaking from the perspective of the designer with the notion that to design is to experience. This idea of designing *through* awe and collective effervescence is reflected by the various design experiments such as the experience mapping, bodystorming, and personal reflections with the main goal of staying close to the phenomenon. It is only through embodying ourselves to the phenomenon that we can truly understand what it actually is.

This thesis offers a theoretical framework to design through awe and collective effervescence in interactive installations. Also proposing a paradigm shift for designers to become more embodied within the world and to begin with awe in their scientific endeavors. Multiple studies have shown how curiosity and awe can serve as a starting point for us designers and researchers to explore the complex and mysterious phenomena of life. (Gleiser, 2021; Gottlieb et al., 2018)

This thesis is an example and also an invitation for other designers to design for collective effervescence and social interaction. In this thesis we provided initial insights into designing for the phenomenon of awe and collective effervescence. More so, we further build upon the theories of embodied being in the world (Van Dijk & Hummels, 2017), participatory sensemaking (De Jaegher & Di Paolo, 2007), designing for awe (Ke & Yoon, 2020), collective effervescence (Durkheim, 1912) and interaction rituals as we explained the relationship between the concepts and phenomenon through various design experiments, further creating this preliminary framework on how to design through awe and collective effervescence in interactive installation.

Furthermore, this thesis serves as an example of how a phenomenological approach can be used in design to explore various phenomena within our daily lives. It also highlights the benefits and possible challenges encountered when utilizing this approach such as the struggle to close to the phenomenon, lack of context, and the lack of a proper user group. Through these contributions, this thesis aims to inspire future researchers to explore designing for experiences which could foster the collective effervescence of awe.

Limitations

Through this research, I have explored how we as designers could better provide and create conditions for collective effervescence and awe to occur in interactive installations. By no means did I test quantitatively whether I am successful in doing so. Collective effervescence in itself is a complex phenomenon. More so, there are minimal studies on how collective effervescence can be quantified. This paper took a phenomenological perspective towards awe and collective effervescence. While it benefits us to stick close to the phenomenon, this approach has its pitfalls.

One of which is the fact that although there are already ways in which awe could be experienced and tested and quantified, I would still argue that awe in itself is a subjective experience. Within this exploration I combine my understanding and experience of awe based on the theory which was provided, my own personal lived experience, the experiences of the participants from the co-creation. This is a small sample of what awe was defined by the group thus, this might not hold true for everyone. Thus, our experience and observations might be subjective and potentially influenced by personal biases. It could be argued that combining this approach with an analytical perspective might help provide a more crucial and critical perspective for understanding the phenomenon and the design factors involved.

Future Direction

Moving forward, there are a number of directions for further exploration. Because of pragmatic reasons, the In-the-Wild use research of the final prototype was conducted in a rushed manner, only spanning a total of 3 hours of observation. Thus it was not possible to collect additional observations. For future research I aim to properly explore the current prototype in a public setting for an extended period of time. This could happen in an open space such as a museum, festival or simply a space within the University. More so, the current state of the installation only allows a maximum of five individuals to interact at once. Moving forward, I would like to manufacture additional spheres to be able to incorporate more people into the experience simultaneously, further stimulating participatory sensemaking and the honeypot effect on a larger scale.

In the beginning of this research, we also spoke about the irony of technology as it was considered to be one reason why we are less present today. It would be interesting to design an interactive installation mainly utilizing analog mediums and as little use of artificial components (ie. computer generated graphics, computer generated soundscapes) as possible, and comparing it to other artifacts which utilizes mainly technological components. More so, together with Vincent, we managed to create a soundscape utilizing instruments, it would be interesting to explore the influences of utilizing more organic and field recorded sounds to create the soundscape.

This thesis also provided a framework to designing through awe and collective effervescence in Interactive Installations. Based on the results of this thesis, it was identified that research within this specific field is limited. As I believe this is the first to present a framework in regards to designing interactive installations through collective effervescence, I would like to raise a call to my fellow designers and researchers to further iterate on this framework in order to create a set of guidelines for us to design for more captivating interactive experiences.

Reflection on the Design Process

*To know means to be silent, utterly silent,
So you can hear the still, small voice within.
To know means to drop the mind.
When you are absolutely still,
Unmoving, nothing wavers in you,
The door open.
You are part of this mysterious existence.
You know it by becoming part of it,
By becoming a participant in it.
That is knowing.*

Osho, Intuition.

In his book, *Intuition*, Osho asks:

What is the difference between knowledge and knowing? There is no difference in the dictionary, but in existence there is a tremendous difference. Knowledge is a theory, knowing is an experience.

This entire design process could be described as an experience of the attempt to be an embodied designer. During the journey of my exploration, I made the conscious effort to align my design with a combination of theory and lived experiences of awe and collective effervescence. Multiple times during this process, I lost track of the phenomenon of awe and collective effervescence that I was trying to capture. It was really when I decided to step back and re-observed what I noticed from the phenomenon that I was able to understand what were the key factors on how to design through collective effervescence of awe.

Here I ask a question: How can I design for something I have not truly experienced? Or am I not aware of experiencing it? While theory allowed me to infer these moments, it was only through my lived experiences and paying closer attention that I truly learned the experience of collective effervescence and awe. The whole design process made me more mindful of the tiny moments of discovery and wonder I find in daily life. More so, through conversations and experiences with others, finding moments of collective effervescence became an integral part of my journey in the design process. It was only *through* the experiences themselves that I was able to end up with a deeper understanding of the phenomenon. From this I believe that it is important for designers to be involved in the experience they are designing for to obtain their understanding of the phenomenon and to get inspiration.

Beginning from a phenomenon

*"There *are* no problems. Only situations - to be dealt with now, or to be left alone and accepted as part of the 'isness' of the present moment until they change or can be dealt with."*

-Ekhart Tolle, Power of Now

Contrary to traditional research methodologies which often begin with a use case or scenario, my exploration began with the phenomenon of the absent presence and collective experiences; which we learnt is called collective effervescence. Starting from a phenomenon meant that I am working in the realm of simply *what is happening?* In which with or without a particular solution, the phenomenon would persist unchanged. This raises an interesting question: Do we even need to intervene in this phenomenon?

I believe the answer lies in what phenomena are of importance to us and how we can intervene. In the case for this exploration, I found particular interest in the phenomenon of being absently present in the world and also the phenomenon of collective moments of awe, in which we later learnt could be defined as the collective effervescence of awe. I believe this is of importance to me thus my research within this topic.

In the beginning of this exploration, I expressed the phenomenon of a state of mindlessness. My research started with what Kenneth J. Gergen described as "absent presence", a state of physical presence in a physical space, however disconnected. This phenomenon has not only led to mental disconnect from the world, but also a level of disconnection to the people around us. However, I have also witnessed how collective shared experiences of awe provide a medium for people to stop in the moment and become present. These moments allow people to be fully present, even if it is in a passive manner.

This study can be based on the Eastern philosophy of witnessing life, or in the west, the concept of Phenomenology first introduced by Maurice merleau-Ponty(1962). Using this perspective, we are able to notice and explore the often overlooked mundane moments in our daily lives. Moments and actions which might seem mundane and are often missed. This pushes a paradigm shift from relying on an analytical approach, to an embodied perspective in which observation and experiencing the phenomenon takes far greater importance than why something happens; Allowing us to take an embodied approach towards designing for the world. This essence of knowing which we acquire from this phenomenological perspective, often manifests itself in the form of tacit knowledge; where it is the knowledge which we gain from our lived experiences which are most often difficult to also verbalize.

Awe as a perspective for Designers

Every scientific endeavor begins with mystery. Scientists engage in their research for a variety of reasons—as diverse as their research interests are. But at the core, we find the same sense of awe and wonder that inspires spiritual ways to look at the world.
-Marcelo Gleiser

Awe is a complex emotion. Ironically I mentioned multiple times how awe is a difficult emotion to comprehend and even more difficult to verbalize. More so, I have mentioned how breaking down the experience makes us lose the entire point, yet here I am trying to explain awe and how it can act as a perspective for us designers to be more embodied in the world. Ironic isn't it?

As designers, we blend technical understanding with our own intuitive insights. In some ways, we are also engineers and artists. This research project has widened my horizon on the relation between my role as a designer and my life experiencing the world as a human. Based on my experience throughout focusing on this exploration and simply being-in-the-world, pursuing a research-through-design project within the field of awe can often be difficult if you yourself are not *in awe*. You might know what it *should* feel like, through theory and knowledge, but without truly experiencing it for yourself, I genuinely believe the core essence of it is lost. Through theory, we have learnt the benefits of awe, how to evoke it, more so, we've learnt what to notice when we experience awe. But have you properly experienced it? And if you have, are you aware of it and how its experience is unique to you?

There is a clear difference between understanding and experiencing. To truly design for something, I believe it is not only about seeing the phenomenon and breaking it down but rather to experience it ourselves. Of course this becomes more complicated when we are designing for specific user groups which have a very different lived experience than ourselves. However, being more embodied by taking part and experiencing their world might give us *clues* and *hints* to what we can design for. And yet, knowing what to design for entails breaking down an experience to its key moments. How can we break down awe to merely guidelines and design factors? We will miss the point of the experience completely! This is the irony of the matter.

Still, this is our challenge and role that we as designers need to accept, to switch between these two lenses of analytical or phenomenological and experiential when designing through awe (and other experiences for that matter). We often will find ourselves struggling switching between being immersed in the experiences of the world, and trying to design for these experiences. We find ourselves on a balancing act which requires us to continuously switch between observing and acting; being embodied and being analytical. This challenge was

present not only within my own lived experience throughout the process of this research, but also in the experiences of my fellow designers who took part in the co-creations. According to (Schell, 2008) in *The Art of Game Design: A book of Lenses* that this is a common struggle for us designers. Thus he suggests doing two passes when reflecting on an experience. When we first recall the experience, we should try to *relive* the experience in our heads without judgment. It is only the second pass or the second time we recall it that we start to question and analyze what key factors we can draw from it. Understanding where to find this balance is crucial in order for us to be critical and create meaningful designs while experiencing first hand what these experiences mean to us through our own senses.

I intuitively believe that in order to design for an experience or a phenomenon, we must first be able to experience it ourselves and be curious of the intricate details surrounding it. To design for an experience, we should first strive to participate in the same (or similar) experience; whenever it is possible. Creating designs to be-in-the-world is nearly impossible if we ourselves are not mindful or in-the-world ourselves. Through phenomenology and a mindset to seek out awe in our daily lives, we as designers can use this as a starting point for us to stay curious about the various mysteries there are in our lives. With this I share my stance on being an embodied designer in this world. I urge designers to become more embodied in the world through experiencing awe in the mundane everyday mysteries in life.

Chapter 10: Conclusion

Bringing it full circle, this exploration began with a phenomenon of absent presence and how collective moments of awe could bring us back into-the-world; a moment of collective effervescence of awe. Through a combination of personal and group experiences, cocreations, and prototyping, I explored the various ways and methods we as designers could design for this complex phenomenon through utilizing interactive experiences and installations. The output of this research resulted in my final design, *You are Here which* tries to encompass the design of how we can facilitate the collective effervescence of awe.

Through this exploration, I presented a theoretical framework for designing for the complex phenomenon of collective moments of awe. We have seen the importance of shared attention, collective exploration, moments of discovery, and being surrounded by people in regards to designing through awe and collective effervescence. Although we cannot conclude for sure if these are all the key design factors, this paper serves as a first indication on how we can design for it.

I also proposed that awe is not an experience that we try to design for, but could also be taken as a perspective for us designers to be more in the world and to explore the various overlooked moments in our daily lives. I emphasized the importance of conducting the research through the perspective of awe and phenomenology and presented how we as designers can use awe as a perspective to design and experience the world to improve our designs. Hence, we aim to design *through* the experience, not only *for* the experience. Both awe and collective effervescence are powerful experiences not only for people we are designing for but also ourselves as designers.

Interactive experiences provide an avenue for us to share these moments of awe together, fully immersing ourselves in the moment. I believe one way for us to become more embodied in the world is through this collective effervescence of awe. Ironically, this study has shown that knowing how to design for such experience relies heavily on tacit knowledge; It is not enough to read and understand these theories and concepts which are involved in this paper. No amount of words written can replace the true lived experience. It is only through experiencing the phenomenon and participating in it that we will truly understand it through our own lived experience.

This is our role as designers, to observe, analyze but also to experience what we are designing for. And once you experience it for yourself, you will know how participating in the phenomenon can help us design for the experience but also immerse us into the present moment. And that is when you will realize: you are here.

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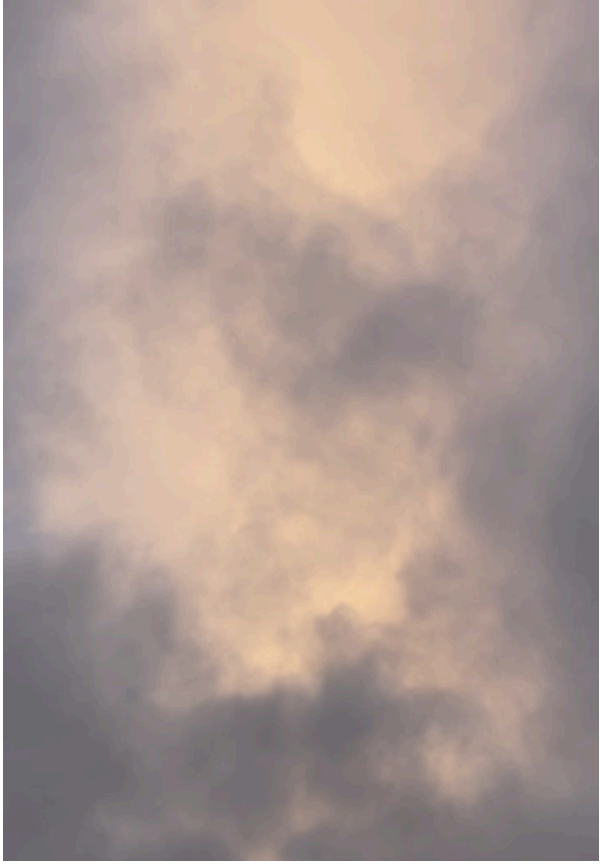
Appendix

Appendix A: Cocreation 1 Result Images



Appendix B: Experience Mapping Results

Participants	P1	P2	P3	P4	P5
No. of post	6	2	1	2	3
Total	14 Experiences Collected				

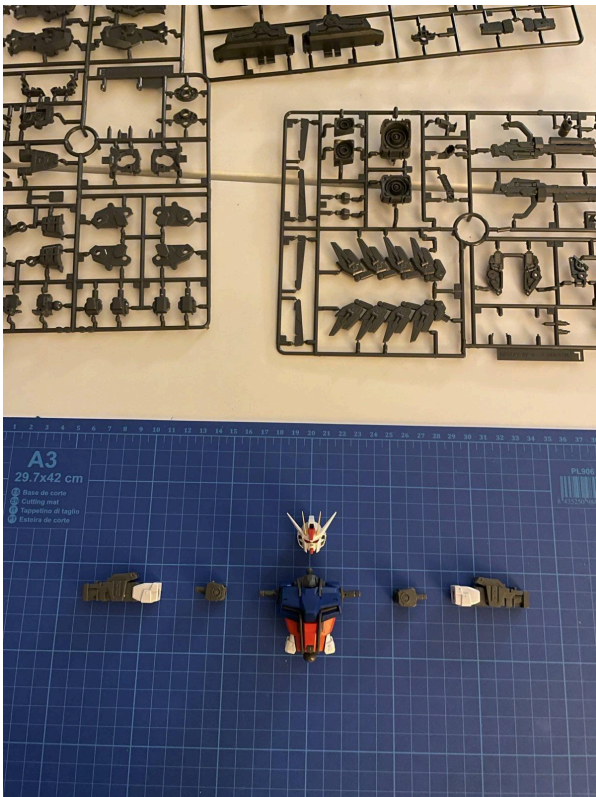
Picture	Entry
	<ol style="list-style-type: none"> 1. I was coming back from uni, just parked my bike and went to the supermarket. It was around 17:30. The tall building next to me was covering the sky. 2. I walked towards the supermarket and saw the sky. The clouds composition and the light passing through catches my attention. 3. The contrast from seeing a homogeneous grey sky for days, seeing this sky with the subtle lights and the abstract shapes that triggered my imagination



1. I was biking, a bit melancholic. Suddenly saw something moving in the road. It was a frog.

2. The fact of seeing something moving catch my attention. It was small and could be just a leaf. But it was a living being.

3. The interaction I had with the frog. I tried to help it going out of the road. I didn't want to touch it but just by standing next to it we managed to 'understand' each other until the frog went back to the grass. This 'conversation' with another living being made me feel more present in that moment forgetting my melancholy feeling and made me focus on the beauty of nature



1. I was feeling extremely bored. Not wanting to be alone but with no choice so I started building a gunpla at home.

2. Every time I build a small part of the model I get this moment full of excitement and admiration to the insane amount of detail that is present in the model. Each building unit has a lot of details that you only experience by building it.

3. How everything clics so perfect and also imagine this little toy as a gigantic machine always amaze me. Every new little element you build is such an amazing experience but when you put every submodule together you feel how big and complex is this little toy. Feels crazy that someone designed all of this.



1. Woke up in the morning. I'm in my room and it's Sunday. The lights are dim and the house is quiet. I take longer than usual to get up; staying in the warmth of the blankets, giving in to laziness.


2. Sokka stands next to me fully awake. He looks like he's been staring at me for long. He starts grooming himself, he also yawns and drawn by minor sounds.

3. I'm in awe for his being. Him simply doing his things. So simple, so full of life.



1. Last Saturday was a Korean holiday, called Daeboreum, where Koreans celebrate the first full moon of the new year. I just habitually started cooking at home and making Korean foods for my boyfriend parents. I was not fully sharp or conscious due to pretty heavy drinking on Friday night. Kind of dull state, it was.

2. In the kitchen, I checked a couple of pictures of Koreans performing celebratory rituals, and I found this picture of Ganggangsullae. I immediately happened to imagine myself dancing together with those women in a beach. It might seem like just a group dancing or activity. However, back in a day when scientific knowledge was lacking, those ritual dancings were kind of how people probably dealt with uncertainty and strengthen solidarity using their spiritual knowledge, I felt.

	<p>3. I felt sort of interconnectedness with the past and somewhere present in Korea where those rituals would be probably being conducted. It's like awe.</p>
	<p>1. I was in my room right after taking a shower. It was late in the evening, I have my warm lights on and feel calm, and more willing to relax after the day.</p> <p>2. I was moisturising my hands and I spot this scratch from my cat from a couple of days ago.</p> <p>3. The scratch has healed so fast. It is fascinating how my own body deals with it, restores, with me having to do not much about it. Just yesterday I had scab protecting the scratch, and today the skin has completely covered, it closes it and gets slowly lost as normal skin again.</p>



1. I went to rotterdam to meet some friends. I dont come there often but i do know about the city and its bombing history a little bit.

2. When walking out of the station the large modern buildings combined with very open space made me feel small and insignificant. The style seems very disconnected from the more classic utrecht or amsterdam style dutch city.

3. I felt that my "knowledge" about the buildings made me a lot more aware of the specific impression they leave.

1. i found this youtube video on a music concept (polyrhythms) ive known about for a while, but taking it to the extreme completely. Polyrythms can create these seemingly unpredictable "patterns" that are hard to work with.

2. I happened to know the artist and about polyrythms so i was quite curious after reading the title.

3. What really made me go "woah" was the creators ability to use classic methods of dynamics (so volume, filters, attack, sustain, etc.) to play into the vibe of the polyrythm at each moment of the song. Even though technically the same pattern is playing forever, the song always feels like its evolving in a significant way.



1. i went for an evening walk around the block, where i always hope to run into some friendly neighbourhood cats.

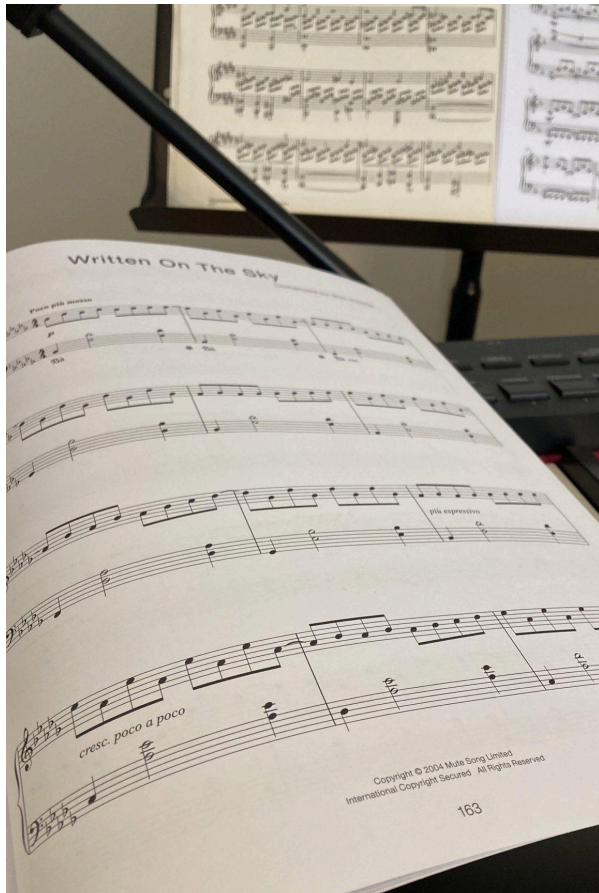
2. This time, after like 2 min of walking, I saw a cat (looking like the image attached) sitting across the street. I went to sit down hoping it would come to me, which it did. I ended up petting it for quite some time. the cat was rly friendly :P

3. After I finally got up and continued my walk, the cat decided it wanted to follow me, walking right next to me til the end of the street, stopping when i would stop, etc. we even sat together waiting for a dog to cross in the distance. one of the cutest things ive ever experienced.



1. I went to an IMAX cinema this weekend to watch Dune 2 because I really wanted to make sure that the audio experience was best.

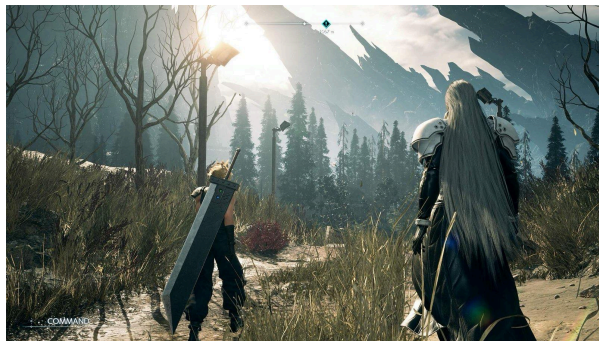
2. / 3. Indeed, the audio was killer, and really made me feel at awe as it elevated the whole experience to a whole new level. It was no longer “just” a visually incredible film, but with the surround audio, and the powerful bass it almost made it seem like you were in a 4D cinema. The whole movie pretty much was awe inducing, however, the parts where it was really apparent were when you could feel the vibrations caused by the spaceships from the audio, or how you would feel immersed by the spatial audio in certain scenes.



1. I sat down in my room and tried to do something musical activity. I figured today would be not a day when my creativity works well. After pushing a couple of keyboards, I got irritated because my body did not move according to my wish.

2. I decided to use my time nicely so I started doing practice piano. There was a piano book I bought years ago but I didn't go through properly because songs in it didn't look interesting. However, without any expectation, I just followed a set of sheets and tried to see what would be coming out of it. Actually, the book had quite nice songs.


3. This feeling of discovery, not coming from a huge/special thing but a small/familiar environment gives me joy and the feeling of connected somehow. I might have been occupied with wishful/remote thoughts. Beautiful things were also close to my daily & familiar space by waiting for my attention.



1. I was laying down in my sofa without anything to do. I was listening to my favorite video game podcast where they usually review and comment the latest releases. I was in a very sleepy and calm mood.

2. They started talking about Final Fantasy VII Remake. More specifically about the world and the characters.

3. The way they talked about it triggered me a huge feeling of awe. As a game developer myself I enjoyed so much hearing all the details and the love the developers putted in the development of this reimagination of a classic game. It felt like I was inhabiting the world they were describing and the fact that we as humans are able to create those alternative worlds is something that amaze me so much. Specially in the context of

	<p>games based on the amount of people that collectively contributed to create it. Is a similar feeling as visiting a cathedral and be aware that it has been built thanks to a big collaboration of human beings.</p>
	<ol style="list-style-type: none"> 1. It was late. A long day at uni. Not that much light outside. I went to pick up my bike to go home. It was not there. I parked in other parking lot. I took my phone, my headphones and played a song. It was a new release of a band I followed years ago. 2. I started walking, hearing the song for the first time. The ambient matched perfectly with the song. The new song was amazing. 3. It felt that someone else played the song for me. I felt inside of a videoclip. All the parts of the song matched perfectly with all the actions I was doing. Walking, waiting to cross, looking for the bike, biking...
	<ol style="list-style-type: none"> 1. Classic doom scrolling moment in instagram. Memes and very frenetic content. 2. I found a post of brutalist buildings. I entered in the account and started scrolling through its contents. 3. I couldn't believe that those buildings exist. I spent few seconds on each picture/video imagining myself taking those pictures/videos. It made me feel super small but grateful of being a human being. So proud of being part of this humankind, able to create such impressive buildings

Appendix C: Cocreation 2 Result Images



COLLECTIVE EFFERVESCENCE

sync up sensory experience

we and been accidentally mirrored our actions during a group picture

ASYNCHRONOUS COLLECTIVENESS

AWE REQUIRES OTHER "LIVING" THINGS FROM HUMANS, TO ANIMALS, PLANTS OR OBJECTS. CAN'T BE EXPERIENCED "ALONE"

COLLECTIVENESS PROMOTES AWE BUT AWE IS NOT EXPERIENCED TOGETHER

DISTANCE & INTIMACY
OF PEOPLE

HYPER(?)

3 or less → INTIMACY
4 or more → COLLECTIVENESS

EXPLORATION: interaction with the other (⊕)
unexpected results with different interactions

EXPERIENCE + EXPLORATION
RATHER
ACTION + REACTION

SEES PEOPLE USING something
GETS INSPIRED THROUGH AWE
STOPS USING IT

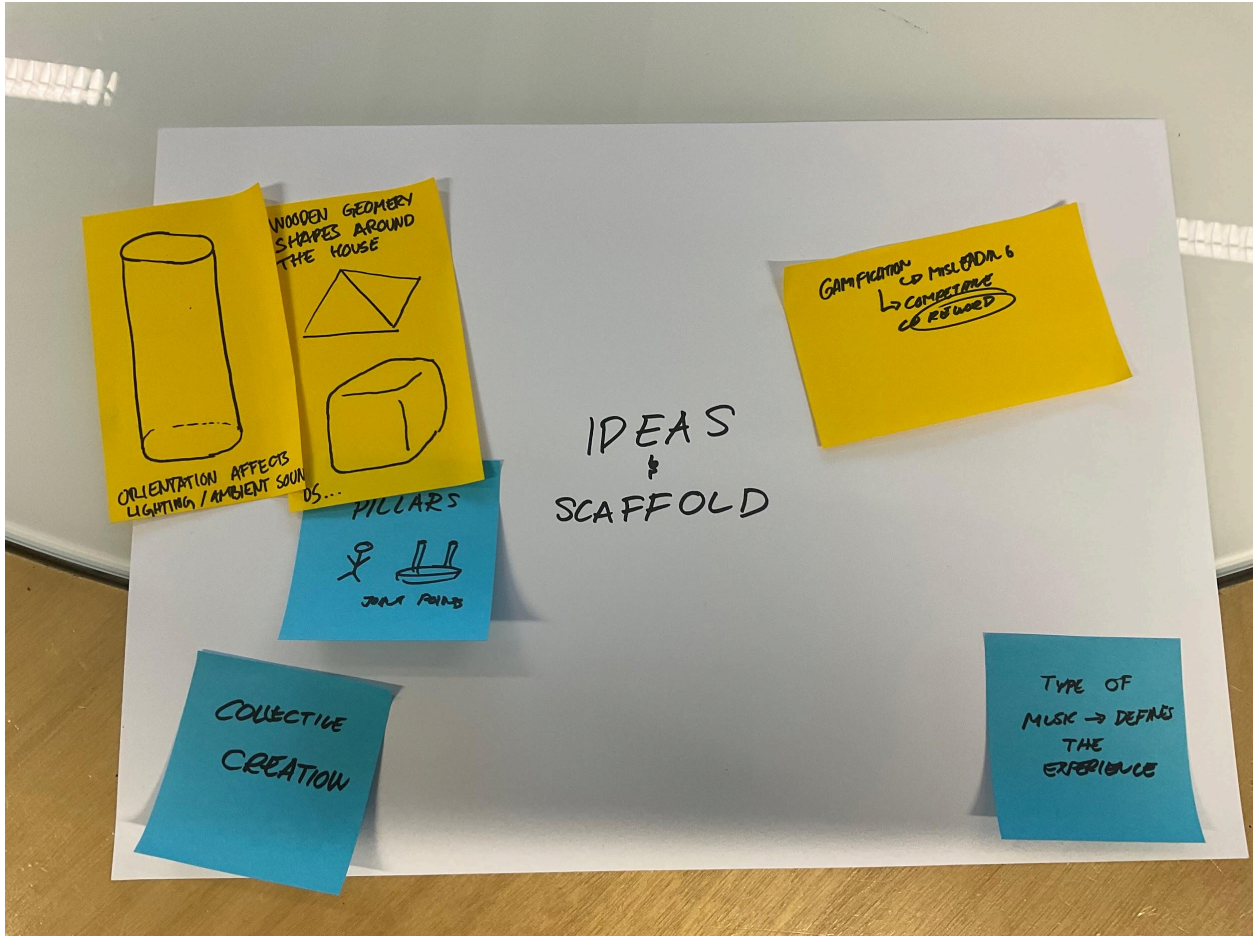
① Improvisation choreography
→ Unplanned synchronisation of more than one's autonomous independent movements.

What facilitates effervescence?
> Proximity? (closer physically)
> Quantity? (time + people, the better)
> Permanence? (for how long they stay)

REACTS TO DIFFERENT # OF PEOPLE

palette cleanser
rebel people to imitate them for an experience

② The synchronisation occurs a couple of times and happens to be harmonised without expectation. & planned orchestration.



ORIENTATION AFFECTS LIGHTING / AMBIENT SOUND

WOODEN GEOMETRY SHAPES AROUND THE HOUSE

GAMIFICATION → MISLEADING
↳ COMPETITIVE
↳ REWARD

IDEAS & SCAFFOLD

OS... PILLARS
JAZZ PAINS

COLLECTIVE CREATION

TYPE OF MUSIC → DEFINES THE EXPERIENCE

Appendix D: Online Repository

The online repository consists of all the programming patches and additional files utilised within the design experiments of this research. It also contains my unpublished research topics report which I reference throughout this thesis. For any questions or request for the online repository, please contact me through email at b.rayhanaryoseno@gmail.com and I will share you a link to the online repository via email.