Participation Gestalt: Analysing Participatory Qualities of Interaction in Public Space

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Figure 1. Three cases of participation in public space. a) Aarhus By Light; b) Talkaoke; and c) The RuneTable.

ABSTRACT

We introduce the *participation gestalt* framework for analysing participation in public interactive installations. Building on the concept of interaction gestalt, we define the participation gestalt as the unified perception and experience of participatory qualities as they unfold through interaction with the installation in a socio-cultural setting. The framework consists of five continua, mapping out the qualities of participation in relation to the degree of expressivity, exposure, investment, sociality and persistence that people experience when engaging in the interaction. Individually, the five qualities provide a vocabulary for analyzing an interactive installation. Combined, the five qualities constitute a participation gestalt framework by which HCI researchers can qualify how a certain forms of participation emerge around public installations. We exemplify the framework by analyzing four public installations in different socio-cultural contexts and examining their participation gestalt.

Author Keywords

Participation; participation gestalt; public space, expression; exposure; investment; sociality; persistence

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

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INTRODUCTION

The term “participation” is traditionally used in HCI to describe the involvement of users and stakeholders in design processes [47] and has strong roots in participatory design [20, 24, 44] but is also commonly used within a wide range of academic disciplines, including participatory art, participatory action research, participatory democracy, and participatory culture [12]. Our research is a response to recent calls to develop a better understanding of participation in HCI. For instance, Carroll and others [47] have stated that within CHI the term “participation” is becoming meaningless, since it is often poorly articulated and theorized in papers, and [48] has identified the need for mapping definitions of participation as one of five urgent key issues within HCI. We echo this concern and argue for a more nuanced and elaborate understanding of participation.

In this paper we maintain a focus on human-computer interaction, but rather than investigating participation in the design process, we turn to how we may define participation in relation to people's *interaction* with digital installations. We argue that in order to *design* interactive installations enabling participation it is crucial to *understand* the participatory qualities of interaction.

In order to conceptualize participation we provide a *participation gestalt* framework by which HCI researchers can articulate and analyse the participatory qualities of interaction with public digital installations. We present five qualities of participation in relation to the degree of *exposure*, *investment*, *expression*, *sociality*, and *persistence* that unfolds in interaction. By mapping these qualities of participation, we propose that HCI researchers can articulate the participation gestalt of a public installation. Building on Lim's work on interaction gestalt [31], we will define *participation gestalt* of a public interactive system as

the unified perception and experience of participatory qualities as they unfold through interaction with the system in a given socio-cultural setting.

Our research into participatory interaction positions itself as part of the CHI community's broader interest in aesthetic [46] and experiential aspects of interaction [34], which has increased greatly in recent years. However, as documented in a recent survey, experiential qualities related to social aspects of interaction are underrepresented in HCI literature: "[...] most approaches on an experiential level still focus very much on the interaction and the 'product' itself" [30 p. 635]. This is problematic, because social aspects have been shown to be very influential in how people interact with installations in public spaces [13]. This indicates a clear need to develop better understandings of the participatory qualities of interaction in public spaces, which has increasingly become an arena for HCI research.

The paper is structured in the following way: First, we present a review of public installations, participation and interaction gestalt to position the participation gestalt framework within existing HCI literature. We subsequently describe the method applied to derive the five participatory qualities and the participation gestalt framework. Each of the five participation qualities is defined in relation to existing literature. We then exemplify how the participation gestalt can be employed as a framework for analysing participation in public installation through five case studies.

RELATED WORK

Our work on understanding and analysing participatory qualities of interactive installations in public space are primarily informed by three fields: interaction in public spaces, participatory aspects of interaction, and interaction gestalt principles.

Interaction in public spaces

Public spaces influence human behaviour and interaction in significant ways. Goffman's seminal works on the presentation of self [22] and behaviour in public places [23] examine how behaviour in public is highly performative and influenced by socio-cultural norms. These works are precursors for many contemporary examinations of interaction in public, e.g. [13], which shows that that people both consciously and unconsciously adjust their interaction with interactive systems in public spaces in accordance to how they think other people perceive of them. Other contributions have indicated patterns of interaction specific to public interactive installations, such as the "honeypot effect" [13], or how the interaction between user and interactive system in public can be designed to influence and shape spectator experiences [40]. Ciolfi [9] argues that an improved understanding of the dynamics of interaction in public spaces is key to developing better systems. Likewise, McCullough [35] highlights how the physical and social context influences public interaction and proposes that we can analyse it in terms of certain "situational types" that indicate archetypical uses of public space. This

spectrum of work on interaction in public spaces underscores the need for interaction designers to develop richer and more nuanced understandings of the particular socio-cultural aspects that are in play in public spaces.

Participatory aspects of interaction

Our work on creating systems that emphasise participatory aspects of interaction is first and foremost inspired and informed by the field of participatory design [19,24,44]. The key difference is that our focus is here on creating participatory use situations, rather than on involving people in the design process, although we in many cases have also carried out participatory design in the development of the installations. Participatory design has a rich history dating back to the 1970s [8]. It was pioneered in Europe, particularly in Scandinavia, and early developments built on the tenet that design of digital technologies is not neutral; even if designers are unaware of it, the systems they develop may enforce, weaken, or otherwise influence socio-political relations. In the early stages, participatory design was primarily oriented towards workplace systems, and an early definition of the objectives of the field by Ehn and Kyng [16] summarizes the key ideals and values as quality in process and work, democracy at work, and education for local development. Since then, PD has evolved and, in line with developments in HCI in general, moved beyond the workplace. Still, core ideals persist, and [25] have shown that the ideals of *quality*, *democracy*, and *emancipation* are still the core values in the field. A recent study of core PD literature, as well as the contemporary PDC conference, suggests that PD has five fundamental aspects 1) People who are affected by a decision should have an opportunity to influence it, 2) People play critical roles in design by being experts in their own lives, 3) The use situation is the fundamental starting point for the design process, 4) Methods are means for users to gain influence in design processes, 5) The goal of participation is to design alternatives, improving quality of life [24 p89].

These principles and values have influenced the development of the installations discussed in this paper, as well as the larger pool of participatory systems they have been selected from (see the *Methodology* section). They have been developed for people to have significant, shared experiences, even if they do not have much insight into interactive technologies; and through these installations, we have sought to create a wider understanding among the public of meaningful alternatives to mainstream interactive systems in order to raise the general level of interest and understanding of the role that such systems can play in society, echoing the values of quality, democracy, and emancipation.

Interaction gestalt

The third main influence for our work is the application of *gestalt* principles to the understanding of interactive systems. These principles originate from the application of gestalt psychological concepts on perception, developed in

the 1930s and 1940s to describe the structured and holistic aspects of human visual perception [28]. Many of these principles, including the laws of *proximity*, *similarity*, *enclosure*, and *continuation*, are to this day applied in interface design [27]. The notion of gestalt has furthermore been applied by Lim et al [31], who argue that “[...] any interaction takes on a gestalt, a composition of qualities that creates a unified concept, configuration or pattern which is greater than the sum of its parts” [Ibid]. The authors propose that the *interaction gestalt*, i.e. the unified perception and experience of interaction as it unfolds, can be characterised by a set of *interaction attributes*, such as *connectivity*, *directness*, *pace*, and *state*. In line with this approach, what we seek is to develop an understanding of the gestalt of participation as it unfolds in interaction, characterised by a set of participatory qualities.

METHOD

The contribution in this paper is the formation of a framework by which designers can better articulate and analyse the gestalt of participation when designing interactive systems for public spaces. To arrive at such a framework, the authors (three senior interaction design researchers) reviewed data from 15 digital public installations from our own design portfolio. The 15 cases were selected to secure a diversity of data for the development of the participation gestalt framework. Eight installations were chosen from outdoor spaces such as a city square, a bus stop, an interactive façade on a concert hall, and an art centre façade. The remaining seven installations were located in semi-public spaces such as museums, libraries, shopping malls, public art exhibitions and public schools. We considered including public installations from other designers, which could potentially expand the data used to qualify the participation gestalt framework. However, an in-depth analysis of participation demands first hand access to observation studies and other types of empirical material, which we could not extract from research publications. Consequently, this paper is based on 15 public installations, where we had direct and first-hand access to the required empirical data.

We then applied an affinity diagramming technique [1] to distill the participatory qualities in each of the cases. By participatory qualities, we refer to qualities that unfold in the interaction between people and an interactive installation in situ, and which are perceived as being related to participation. By reviewing data from observation studies, databases of completed interactions, and field notes (see each of the case examples below for a more thorough description of the empirical data), we focused solely on the participation as it occurred between people and a digital interactive system in a public setting as the focus of analysis. The authors individually labeled the participation qualities that emerged from reviewing the data. Two questions framed this analysis. We wanted to 1) address how people participate in the digital installation and 2) how we can describe these modes of participation. This process

led to the formulation of 24 participatory qualities, of which six were ruled out as being qualities of the installation itself and thus not a quality directed towards participation. As an example, one of these omitted qualities was “accessibility”. Some of the public installations were very accessible, as people would literally walk into the installation without noticing. Other installations demanded deliberate choice of going somewhere specific and signing up for participation. The reason for omitting this quality was the fact that accessibility would be a quality of the interaction gestalt – not directly a quality of participation.

From the 18 qualities selected in the first round of analysis, we were able to relate and group the qualities into five distinct qualities: *exposure*, *investment*, *expression*, *sociality* and *persistence*. We then initiated a second round of analysis based on the original 15 cases. In this round, examined whether the five qualities sufficiently contributed to identify the uniqueness of each of the five cases. By applying the qualities to the 15 cases we were able to determine to what degree the qualities were present. While the five qualities were operative for analytical purposes, it was also clear that they were present to very different degrees. Some cases had a low degree of exposure where others exposed the participants’ interactions on huge public displays. In other cases, participants were highly engaged in the social interaction with other participants, where other cases had a low degree of sociality. This led us to articulate each of the five qualities as a continuum, ranging from a low to high degrees of their presence.

PARTICIPATION GESTALT AND PARTICIPATORY QUALITIES

Informed and inspired by the above-mentioned works, we define the *participation gestalt* of a public interactive system as the unified perception and experience of participatory qualities as they unfold through interaction with the system in a given socio-cultural setting. While the interaction gestalt [31] focuses on the attributes of interaction and how they can be designed to shape interactions in their examination of interaction gestalt, our objective here is establish a framework for understanding and analysing the participatory qualities of interaction as it unfolds in situ. We therefore consider the participation gestalt framework to be a supplement to the conceptualisation of interaction gestalt, not a replacement. Figure 2 illustrates the relation between the two concepts.

Figure 2. a: Interaction Gestalt, reproduced from [31] in relation to b: Participation Gestalt.

As indicated by Figure 2, our focus here is in CHI terms on the I(nteraction), rather than on C(omputer) or H(uman). We by no means discount the importance of C and H in shaping the I, but our objective is to examine the particular characteristics of participatory interaction as it unfolds in the encounter between the two. The participation gestalt is composed of five participatory qualities - *expressivity*, *investment*, *exposure*, *sociality*, and *persistence* - which have been developed as described in the *Methods* section. The qualities are not mutually exclusive; rather, they influence each other and may unfold at the same time during interaction. In order to support the analysis of the participation gestalt of a given interactive situation, we propose a visualisation that indicates how interaction with the system unfolds according to each of the five qualities, ranging from a very low to a very high presence of the quality, see Figure 3. This visualisation is not intended a precise measurement of the participation gestalt, since the quantification of the qualities in themselves are not enough to understand the participation gestalt, but rather as a tool to support analysis and discussion.

Figure 3. The five continua of participatory qualities.

In the following, we will describe each of the five qualities, before applying them in the analysis of real-life cases.

Expressivity

We define expressivity as the way and degrees to which people can convey thoughts or feelings through interacting with an installation. We often focus on the functional aspects of interaction, such as whether input is detected or not. However, recent contributions [38, 42] have shown that the ability for people to express themselves plays a major role in how they interact with a system, and [19] identify expressive interaction as one a main component of understanding user experience. An installation can support high degrees of expressivity by offering multiple modes of expression - e.g. by allowing people to express themselves in different formats such as text, audio, video, as well as bodily - and/or rich and nuanced means for expression - e.g. by allowing people to create nuanced statements. In contrast, an installation that provides one or few un-nuanced means for expression will often lead to low degrees of expressivity in interaction. Expressivity in interaction also depends on people's competences with the given medium. For instance, a trained dancer may achieve a high degree of expressivity through motion capture, while the same may be true of a poet using SMS as an input. On the other end of the spectrum, the Blinkenlights Pong installation, in which users control a paddle on a building sized display in a classic Pong game, represents a low level of expressivity in interaction.

Investment

We define investment as the resources and efforts that people commit in order to successfully engage in interaction. We thereby align ourselves with [15,41] investigating how participants as resourceful individual and groups invest their time skills, knowledge and imagination when engaging in interactive installations. An installation can demand a high degree of investment by requiring people to commit mentally and physically to the interaction over a period of time, possibly requiring them to develop certain skills, for the interaction to be truly meaningful and successful. On the other hand, other installations require low degrees of investment, some to the extent that people may hardly notice that they are even interacting, e.g. through tracking people moving through a public space and using this as input for an installation. In some installations there is a reciprocal relation between the required investment and the fulfillment that people feel in the interaction, meaning that people who invest much in the interaction may feel more richly rewarded if and when the interaction turns out in a satisfactory manner than if the same goal is achieved through minimal effort [4]. An example of a low degree of investment is a bike traffic counter that registers every bike that passes on a bike lane and displays the total number of cyclists. In contrast, we see a high degree of investment in interaction among Dance Dance Revolution players in Asian arcade culture, who often build up amazing expertise and commit themselves to putting on elaborate public performances in arcade halls.

Exposure

We define exposure as the degree to which participants attract attention or are visible to other people during or after interaction with an installation. As examined in [13], the real or perceived exposure of people interacting with installations in public spaces can have a dramatic influence on their behaviour, to the extent that it can even lead potential users to not interact at all. This concern for exposure and privacy is heavily debated in existing HCI literature on public installations [10,36,18]. A crucial element with respect to exposure is whether the effect of interaction can be associated with the person causing the effect. Elements of exposure include the identity of the person interacting, and the extent to which the person is visually recognizable in the location of interaction or in other locations. Interaction with large and highly visible displays in public spaces often makes users' actions highly exposed. At the other end of the spectrum, low exposure is, for instance, when people anonymously interact with a small-scale display using a mobile phone.

Sociality

We define sociality as the opportunity for participants to engage with other people when interacting with an installation in a public space. As examined in [32], interaction designers can address a spectrum ranging from individual to highly social interaction in public installations. Furthermore, configurations of individual and social

interaction can dynamically evolve over time [37]. An interactive installation can support individual interaction by limiting or even preventing the participant from engaging with other people, for instance by restricting others from accessing the input and output of the interaction. An example of a low degree of sociality is thus the public automated teller machine, in which sociality for safety reasons is restricted, if not outright prohibited. On the other hand, an installation can provide participants with means for engaging with others by exposing the interaction and by providing means for others to engage actively or passively in the interaction with the participant. An extreme case of an interaction design that enables a high degree of sociality is found in the interactive library floor “iFloor” where people only can navigate the repository of text entries projected on the library floor by collectively moving a cursor [28].

Persistence

We define persistence as the timespan during which the outcome of an interaction are exposed and remains accessible to others. The importance of persistence in relation to participation resonates well with current heritage studies in HCI. Here, participants’ ability to leave “social traces” is considered decisive for engaging in interactive public installations and for the entire museum experience [11,21,26,43]. A high degree of persistence will allow participants and others to retrieve the outcome of the interaction. Conversely, a low degree of persistence limits the possibility to explore the outcome of an interaction. An example of low persistence would be a game on a media façade, in which nothing is stored and the participation is limited to the timespan of the interaction. On the other hand, a high degree of persistence is found in the Google my Head installations [45], where participants at a museum leave their statement on a topic by combining elements of the museum exhibition. The participants’ statements become an integral part of the museum exhibition and are retrievable during the entire duration of the exhibition.

Analysing participation gestalt

We encourage HCI researchers to utilize the five participation qualities by addressing five questions to their empirical data from participation in public installations:

- To what degree do participants express themselves during the interaction with the installation?
- To what degree do participants invest their time and effort in the installation?
- To what degree is the participants exposed in the interaction with the public installation?
- To what degree do participants engage in interaction with other participants during the interaction with the installation?
- To what degree do participants leave traces accessible to others?

When analyzing an installation, it is advisable to generate a full list of observations for each question to characterize the

degree of expressivity, investment, exposure, sociality and persistence. Based on *qualitative* analyses of such data, researchers can grade an installation according to the continua of the five participatory qualities, see Figure 3, and accordingly discuss the installation’s participation gestalt. Below, we apply and exemplify this approach to the participation gestalt framework in the analysis of four interactive public installations.

ANALYSIS OF FOUR PUBLIC INSTALLATIONS USING THE PARTICIPATION GESTALT FRAMEWORK

The first installation, *Aarhus By Light*, is a large scale media architecture installation in a very prominent public space; the second installation, *Talkaoke*, is also a public installation, but of smaller scale and centred around a table at a city square. The third installation, *Climate Confession Booth*, is in two parts, one in an indoor exhibition space, and the other part distributed in different public spaces at bus shelters and information booths. The fourth installation, *The RuneTable*, is an indoor installation at a cultural historical museum. For each installation, we first offer a short presentation of the installation itself and the context it was part of, followed by an account of data collection methods, before moving on to the analysis itself. For the analysis, we identify how participation unfolded with respect to expressivity, investment, exposure sociality, and persistence.

Aarhus by Light

Aarhus by Light, shown in Figure 1 a), was a large-scale interactive media façade installed on a concert hall in a public square in Aarhus [6,14,15], see also the enclosed video. The intent behind the development of the installation was to examine how media architecture could transform the perception and use of a public space, in addition to drawing extra attention to a cultural venue.

The Aarhus by Light installation, which ran around the clock for two months in 2009, was composed of 180m2 semi-transparent LED displays integrated into the concert hall façade, combined with three interactive zones in which cameras captured the movement and gestures of people passing by and interacting. People’s silhouettes were then magnified and displayed on the façade, enabling them to interact with digital creatures inhabiting the façade, as well as signaling their interactions to other people observing the façade. The digital creatures would respond to silhouettes in different ways, e.g. by greeting them, fighting them, or crawling onto them. In addition, the digital creatures would respond to each other according to individual algorithms, e.g. by kissing or kicking one another. In addition to interacting with the digital creatures, many people used the installation in other ways, e.g. by dancing with one another or shadow boxing with users in different interaction zones.

The analysis of the participation gestalt of Aarhus By Light is based on thorough documentation and data from the two months during which the installation was in use. The data consists of both quantitative and qualitative data. The

quantitative data stem from a) a log of activation data, which recorded each instance in which a silhouette was detected in an interaction zone, and b) heat maps composed by overlaying time-lapse photos of the installation from a nearby tower, in which the presence and movement of people was emphasised for analytical purposes. The qualitative data come from a) in-situ observations, b) video recordings of the installation in use, and c) 25 semi-structured interviews with duration of 15-25 minutes each. This data was subsequently coded and analysed.

Analysis

Analysis of the data shows that a number of interaction patterns emerged. Most people who were in the park during the installation's run-time noticed it and figured out the basic mode of operation. While some preferred to observe from the outskirts of the interaction zones, the interaction zones became hotspots on the heatmaps, which also revealed that the general use pattern of the park changed drastically. The façade and the interaction zones became focal points for passers-by and visitors to the park and the concert hall, and many people engaged with the installation in some form. Children would interact with the installation on their own or form connections with other users, while adults would mostly use it when in company with others they knew, be it family or friends. Some children would play with the installation for as much as 30 minutes, but most people would only actively interact for a few minutes, although they would often spend more time observing other people interacting.

The *expressivity* that unfolded in the interaction between the installation and visitors and passers-by was generally fairly low. While it was easy for people to recognize their silhouettes and figure out how to interact, the low resolution and limited means of input meant that most carried out basic gestures and movements such as waving their arms, kicking, and running around. A minority of the users engaged in more expressive interaction, such as dancing, doing synchronized movements, or shadow boxing with other users. During a special event in the concert hall, the installation was used by a troupe of professional dancers. Unsurprisingly, the level of expressivity in interaction was markedly higher for these trained professionals.

The interaction zones were placed in a trajectory such that most people approaching the building were likely to see that their movements were in fact causing the silhouettes to appear and move on the façade. As a walk-up-and-use installation, Aarhus by Light therefore required little initial *investment* apart from moving through an interaction zone. Some would even interact unwittingly, since the interaction zones were placed along main transit corridors in order to capture people's attention. The users who spent a bit more time exploring the installation, either through interacting with it themselves, or by observing others, soon noticed the

interaction between the digital creatures and the silhouettes. Some then started playing with the creatures, pushing and lifting them around. While this was a minority of users, the qualitative interviews revealed that many of these users started attributing traits to the creatures that went beyond their programming. E.g. users told us how they thought that their interaction would cause creatures to form friendships or to run away to occupy other parts of the façade. Other users became invested in interacting with other users, e.g. in the case of the aforementioned dances or shadow boxing matches. For both of these groups of users, the efforts invested in interaction resulted in a feeling that they got something special in return.

There was a high degree of *exposure* for people interacting. The silhouettes effectively served as an amplification of their movements, projected in large scale onto one of the most iconic buildings in the city. Since interaction took place in dedicated zones, it was straightforward to identify who was interacting at any given point in time. However, the fact that silhouettes were shown, rather than a high resolution video feed with recognisable facial features, did smooth out the feeling of being exposed, since everyone interacting was represented in the same manner; everyone was effectively a silhouette, rather than a recognizable person.

Interaction with and around Aarhus by Light unfolded in a highly *social* manner. While some interacted with the installation individually, a large portion of visitors and passers-by were already in groups when entering the park, either with friends or families, and when one person started interacting, others would often follow. Also, the size and number of interaction zones caused new social bonds to be created during interaction. Perhaps even more importantly, the installation created a new way for people to experience the park and concert hall together by making the ongoing interaction public and offering new opportunities to engage with both the installation and with other visitors.

For all intents and purposes, the *persistence* of interaction with Aarhus by Light was low. The moment users stepped away from the interaction zones their silhouettes disappeared. This spurred spontaneous interactions that might not otherwise have happened; for instance, we were surprised to see many adults jump straight into the action with their children, when we had observed more hesitant interaction among adults at other public installations.

In summary, the participation gestalt of Aarhus by Light is characterised by low degrees of expressivity, investment, and persistence - typical of many walk-up-and-use installations - while at the same time having a high degree of sociality and the most radical amount of exposure of the four installations examined in this paper, see Figure 4.

Figure 4. The participation gestalt of the four installations.

Talkaoke

Talkaoke is a dynamic mobile talk show originally developed by the British critical art group *The People Speak*. A conventional talk show is a television program genre where a host is having a discussion with one or more invited guests. Talkaoke is also a discussion format but in contrast to a conventional talk show, Talkaoke is a pop-up event at music festivals, conferences, street parties or other kind of out door event. The host sits in the centre of the custom designed round Talkaoke table and passers by are invited to sit down around the table and passed the microphone to take part in the discussion. In the generic version of a Talkaoke there is no agenda, but a Talkaoke may be organized with a specific theme in relation to the event the show is part of. The Talkaoke table is equipped with speakers and video recording equipment enabling distribution and sharing after the Talkaoke. The video signal is during the show displayed on monitors integrated into the side of the table or on separate monitor(s).

The analysis of the participation gestalt of Talkaoke is based on an installation that was part of the events leading up to the UN climate summit, COP15, in Copenhagen 2009, Figure 1 b) [37]. For two days a Talkaoke was set up in one of several pavilions at the city's central main square in order to stage awareness and debate about climate issues. Participant observation as well as more than 20 hours of video recordings from two Talkaoke shows in December 2009 constitute the basis for the analysis.

Analysis

During the Talkaoke event, participants were invited to bring their own agenda to the table, as the talkshow host of the December 11 explains in an opening statement: "This is your talk-show so we'll just go in whatever direction the people around the table want to go in". As reported by Andersen, Løfgreen and Pold [1] the strong context of COP15 did set the agenda and made people discuss the climate crisis not only in general but also how people on an individual level experienced and related to the climate crisis. But many other aspects of life were discussed as well (including shopping, consumer culture, pop idols, pet animals and much more). *Expressivity* was only limited by what people could express with words, which offered people a nuanced opportunity to express themselves [1].

Taking part in the Talkaoke talk show did not require any specialized skill but was dependent on people's willingness to invest themselves by approaching the Talkaoke table,

share their view on the climate issue, and engage in dialogue. In this respect the installation required some initial *investment* but particularly higher investment during discussion with the Talkaoke host and other participants. At a one instance during the COP15 Talkaoke, one participant got so excited about the format that he broke the rules and entered the middle of the table and tried out the role of host [1]. Further adding to the evidence of high investment participation is the fact that, according to Andersen, Løfgreen and Pold [1], participants spent up to 45 minutes at the table, on average 23,65 minutes, and respondents who just listened spent on average 22 minutes. Out of the estimated thousands of people who experienced the Talkaoke event, approximately 100 participated actively at the table.

During the event a basic *sociality* unfolded in the sense that the Talkaoke host initiated a dialogue with the participants. For instance at one instance one participant asked himself whether he was prepared to change his lifestyle, which made the host pass the question on large group of students. First they shouted 'no' but the situation evolved into a longer discussion about values and consumption [1]. At several instances groups of climate activist (e.g. Climate Debts Agents) engaged in very reflective debate about the climate, evidence which added to the high sociality of the Talkaoke installation.

The very nature of the Talkaoke is that of a live event with a very high degree of *exposure* in a public setting. In addition to people being highly visible and audible while standing around the table, a video signal of the discussion was displayed on a large screen at the city square and also broadcasted live on the Internet. The recordings were stored in a publicly accessible web archive, meaning that the *persistence* of the Talkaoke event was high, although access to the web archive was not supported during the event.

In summary, the participation gestalt of Talkaoke is highly social and characterised by very high degrees of expressivity and investment - a radical contrast to Aarhus by Light - as well as relatively strong exposure and persistence, see Figure 4.

Climate Confession Booth

The Climate Confession Booth was a video installation that put a face on the struggle for climate improvements and offered the citizens of Aarhus a voice to be heard – and seen – throughout the city. The installation was part of the

Municipality of Aarhus' campaign CO2030, dedicated to engaging citizens in the efforts to achieve carbon neutrality by the year 2030. The installation was in two parts, one being part of an exhibition space, and another in public space, see Figure 5. In the exhibition space, visitors could enter a booth with a camera providing visitors the opportunity to video record a short statement about climate change, for instance confessing taking long and hot showers every morning and hereby contribute to excessive CO2 emissions. The video statements were subsequently edited and distributed to displays integrated into bus shelter and info stands at four locations in the city [32].

The installation was in operation for four days and a total of 68 videos were recorded, of which one hour was analysed in detail [2]. The analysis of the participation gestalt of the installation was further supported by in situ observations, described in more detail in [32 p 214].

Figure 5. The Climate Confession Booth.

Analysis

As mentioned, The Climate Confession Booth was distributed across two quite diverse locations. The exhibition space in Ridehuset offered very limited *exposure* since people had to enter the confined space of the confession booth with the option of closing the curtain behind them while recording their climate confession. In contrast, the resulting video recordings were highly exposed by being shown on displays integrated into bus shelters and info stands at four busy locations in the city. However, observations of the displays integrated into bus shelters and information stands revealed that not everybody noticed the video content, perhaps because the displays blended into the bus shelters with visual content, which could be mistaken for being the advertisements commonly shown at bus shelters. Only 13% of people waiting in the bus shelters during periods of observation activated the sound of the video recordings so they could actually hear the confessions [32]. However, interviews with people waiting at the bus shelters reveal that many could relate to the personal stories being told, which led them to consider their own practices.

The setting around the booth itself was framed as an opportunity or invitation for people to have their voice about environmental sustainability heard, but actually had an unconstrained opportunity to say whatever they want in the booth. The *expressivity* was only limited what could be said by words, and, moreover a few participant also brought along with them props like fruit, yarn and knitting pins as

means of expression. The design of the installation was originally designed with intention that the participant would sit on the chair in front of the camera, but several participants transform the booth into a stage for performances, for instance by singing or dancing. At another instance a young man made a very visual statement by making obscene gestures in front of the camera, probably meant more as provocation than as a comment on climate change. During the editing process and before distributing the video to the public displays, the organizers had opportunity to filter out statements not related to environmental sustainability.

By entering the booth people made an active choice and furthermore *invested* themselves by sharing some of the sins they have committed, as illustrated by the following quotes: “I confess. I have been a climate-idiot. And I don’t want to be that guy anymore”, or “I usually have my computer and my TV set turned on, and I know that I ought to unplug electronic devices while I don’t use them”.

The booth was intended for *individual* interaction, but in some instances a small group of people entered the booth, as in the case where a mother and her daughter is having a little chat about the climate situation. The video became part of more complex social configuration at bus shelters.

The video recorded in the booth was distributed to public display at bus shelter and info stands, but not stored, distributed or made available beyond the few days the booth was in operation, meaning that *persistence* was low.

In summary, the participation gestalt of the Climate Confessions Booth has remarkably high degrees of expressivity and investment and a medium level of exposure, akin to Talkaoke, but a much lower degree of sociality and persistence, as illustrated in Figure 4.

The RuneTable

This case derives from the cultural heritage exhibition on runic stones at the Moesgaard cultural heritage museum. Among Moesgaard’s large collection of cultural heritage objects is a selection of rune stones from various parts of Denmark that have been on display for several years. Our research team created an interactive installation, the RuneTable, that experimented with linking museum knowledge about runes with the everyday lives of a younger audience. The RuneTable reflects a trend of allowing museum visitors to be active participants and even contributors to the exhibition space, in this case by erecting their own rune stones and expressing their emotions in writing on them [16].

The RuneTable installation allows visitors to create and decorate their own rune stone and place it in a digital landscape alongside rune stones that other visitors have created, see Figure 1c. The installation consists of a 165x135cm interactive table with two touchscreen input stations at the end. The table shows a map, where particular features are highlighted: cities, large roads, forests etc.

Visitors create their own rune stone by picking up one of the small wooden model rune stones found around the table and placing it in the backlit holder besides the input station. When a model stone is placed in the holder, the input station guides the visitor to write on the stone and how to decorate it. When the stone is done, the visitor can pick up the stone from the holder and place it on the map. When the model stone is placed on the map, a counter indicates that the stone is about to be placed at this particular spot a few second (if the stone is not moved to another location on the map) a digital representation of the stone is shown on the map. Visitors could use a model magnifying glass to explore the content and placement of the stones created by other visitors. The analysis of the participation gestalt in the RuneTable installation derives from Moesgaard Museum as part of the “*From Gravestone to Grafitti*” exhibition. In the first 14 days of the exhibition, a total of 331 rune stones were erected by visitors and thereby stored in the database. Five 60-minute observation sessions were conducted during the same period of time. Here, researchers observed the visitors and reported in field notes how they engaged in the interaction with the RuneTable installation.

Analysis

The means by which a visitor could honor a friend or relative was limited to a text entry on 140 characters. The installation prompted the visitor to identify a sender (often the visitor would provide their first name) and a recipient (a name or a category such as “my grandfather”). Having provided the stone with a sender and a recipient, the visitor was free to express any textual input. The interaction had a fairly high degree of *expressivity* as visitors were able to generate a personal message. Most participants expressed their emotions towards present or past family members and friends by erecting stones with a very personal message such as “*Jonathan set this stone for his cousin who sadly died at the age of ten*” or “*Jeppie set this stone for Anne who is a nice chick*”. However, by prompting the visitor for a sender and a recipient, the installation did not allow the visitor to communicate anything other than a personal message from a sender to a recipient.

Observation studies disclosed that the visitors spent up to five minutes considering who they would dedicate their runes stones for and what message they wanted to send. Some visitors made several text entries carefully considering and reconsidering their text message before deciding on their final statement to be displayed on the rune stone. The very personal messages were also found in the database of erected rune stone, which to a very high degree reflected personal messaged to beloved friends and family. We consider this to be a high level of *investment*, as visitors sincerely invested time and effort to consider to whom the particular stone was addressed and what message they wanted to communicate in the text input on the stone.

The visitors were exposed during the interaction with the RuneTable. However, the creation of the rune stone was not

exposed to anyone but the visitor herself. When placing the rune stone in the digital landscape, others could access the rune stones and read statements made by others. As the number of rune stones created in the installation gradually increased, it became harder to retrieve a particular rune stone from the landscape. The level of *exposure* of the museum visitor was thus relatively low in the installation.

The visitors primarily addressed and engaged in the installation as individuals. The use of a relatively small text entry screen and the fact that the visitors were encouraged to express a personal message made limited the *socialization* in interaction to a minimum. Occasionally, two visitors would negotiate to whom a RuneTable would be dedicated but often times, the interaction was limited to one individual visitor. Observation revealed that numerous visitors would explore the digital rune stones (erected by other visitors) on the interactive map simultaneously. However, the exploration of rune stones was also encountered as an individual endeavor. Visitors would quietly use the wooden magnifier to explore the wording on the “digital rune stones” that were placed throughout the landscape. It seemed as if the very personal messages encouraged the visitors to silently and almost solemnly explore the rune stones on their own.

The rune stones erected by visitors were accumulated and stored on locations in the digital landscape. Thus, the interaction was *persistent*, and to some extent the individual interactions were even retrievable if the placement of a rune stone was already known. Observations did not reveal any museum visitors searching for particular rune stones. The landscape was most frequently used for browsing around in a random selection of rune stones. The level of persistence can be categorized as moderately high.

In summary, the participation gestalt of the RuneTable, illustrated in Figure 4, is characterised by high degrees of expressivity, investment, and persistence, while exposure and sociality are the least prevalent among the cases examined in this paper.

DISCUSSION

The unified perception of participation visualized by the model in Figure 4 clearly reveals that each case has a distinct participation gestalt. While we have focused on in-depth analysis in this paper, rather than the identification of participation gestalt patterns across a large range of installations, we speculate that applying the framework to a larger pool of installations will provide the basis for identifying certain patterns of participation. For instance, the participation gestalt of Aarhus By Light may suggest a pattern of lightweight and playful participation in contrast to more serious and committed patterns of participation represented by installations such as Talkaoke. An additional aspect of the unified nature of participation gestalt is revealed by the interdependence of the five qualities, which we encountered numerous times in the analysis. For instance, the bodily expressivity of Aarhus by Light is

closely related to the investment required when dancing, which in turn leads to a high degree of exposure at this installation. Likewise, in the case of the Talkaoke, the persistence of participation through storing video resulted in an increased exposure of participation on social media.

Several of the installations are in a separate mode at different points of interaction, underlining that participation is a process that unfolds over time. During the recording sessions in the Climate Confessions Booth, exposure is quite low as opposed to when the video recording later is exposed on the bus shelters in the city. A similar dynamic is found in the case of the RuneTable, with low exposure during the creation of the text on a rune, which becomes more exposed when placed on the table. Likewise, sociality may dynamically change over time, for instance when a single person interacting with Aarhus by Light is later joined by another person.

Though we have analysed a limited number of participatory installations, we can identify a tentative set of signs of participation with respect to each of the five qualities. For example, the degree of expressivity has been influenced by 1) bodily interaction, 2) use of props, 3) unrestricted use of language, and 4) limited length of text entry. Investment is dependent on 1) taking an active initiative as opposed being involuntarily “participated” in interaction, 2) on time spent interacting, and 3) on disclosing personal information. Exposure is reflected by 1) the visibility of the interaction itself, as well as 2) the visibility of the effect of the interaction on displays, and 3) the extent to which the identity of the participant is disclosed.

The participation gestalt framework has some limitations due to way it has been developed, as well as the nature of the study conducted. The five qualities of participation were developed through affinity diagramming, which is highly usable for structuring and categorizing a dataset. However, affinity-diagramming limits the outcome based on the dataset provided in the diagramming process. Accordingly, our qualities of participation are limited to the analysis of the 15 cases, and we cannot rule out the possibility that a similar process with a different data set would lead to different outcome of participation qualities. However, the qualities are grounded patterns identified in previous work, and there is reason to expect that other researchers would arrive at similar patterns. A second limitation is our choice of five qualities. We deliberately limited the selection in order to arrive at a concise selection of qualities, specifically intended to support the identification, analysis, and discussion of participation in public interaction. A more expansive set of qualities may provide more nuances, but may also be more difficult to employ to detect patterns across multiple installations. Thirdly, since the framework is intended for analysing public installations in which participation is as a key component in the user experience, there are many types of public interactive systems, e.g. ATMs, for which it would likely yield few productive

insights. As we have stated, we consider the framework a supplement to other analytical tools, such as the interaction gestalt framework [31], which would likely be better suited for such systems, and which could add further nuances to understanding the cases examined in this paper.

Moreover, the participation gestalt framework derives from an analysis of cases, which were all developed by a team of researchers rooted in the Scandinavian participatory design tradition. Future studies will indicate whether the framework is applicable to public installations with other epistemological out-sets, as we will 1) expand the number of installations in our participation gestalt analysis, and 2) carefully select public installations with a diverse set of demographic and epistemological backgrounds to examine the potentials of the framework.

We envision four future activities for further developing the participation gestalt approach. Firstly, we invite other researchers to apply the model on their public interaction designs. This could provide new qualities to be added to the model and an evaluation of the framework according to different socio-cultural contexts. Secondly, and as a concrete next step in our research, we will investigate how the model can serve as the basis for analysing of specific properties of an installation (e.g. display size, interaction style) that enable or inhibit different aspects of participation. This, in turn, may lead to design recommendations for developing installations that scaffold specific types of participation. Thirdly, more work is needed to understand how the framework supports the dynamics of participation in an installation across its period of use. Fourthly, we will investigate how the framework can be proactively used in the design of new installations. In its current form, the framework solely supports retrospective analysis of existing installations.

CONCLUSION

We introduced this paper by proclaiming the need for a vocabulary and a better understanding of participation in digital public installations. By introducing five qualities of participation and a distinct method for applying the qualities in an analytical framework, we have contributed with a language to articulate participation as it unfolds in interaction. Individually, the five participation qualities provide a lens for analyzing interactive installations in regard to expressivity, investment, exposure, sociality and persistence. Combined, the five qualities constitute a participation gestalt by which HCI researchers can qualify and discuss how participation emerges in interaction with public installations.

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