Ambient interaction and situational influence: case studies in public sites

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Abstract

An audience’s direct physical intervention is widely believed to be instrumental in the field of interactive art. However, this long established expectation faces new challenges through the increasing accessibility of a growing diversity of interactive technologies and ubiquitous smart media. Such innovations are often fully integrated components of interactive public artworks, many of which do not directly involve audiences or individuals as key agents in the functional or aesthetic realisation of the work. Based on three case studies of interactive artworks in public places, this article identifies an important characteristic of interactivity in interactive art, through the largely unexplored concept of “Ambient Interaction” in which artworks are embodied and enacted through environmental conditions and situational influences rather than exclusively through people’s intentional and direct physical engagement.

Keywords: interactivity, ambient interaction, interactive art, public art, situational influence

1 Introduction

This article proposes the concept of “Ambient Interaction”. Rather than directly associating interactivity with people, by interacting with a broader range of environmental influences (e.g. light, temperature, sound, non-intentional human interaction or other causal agents), artworks may produce diverse (ambient) interactivities, through which the aesthetic value and interpretive content are manifested and augmented/transformed. This concept initially emerged during several field studies of interactions between people and different interactive artworks displayed in freely accessible public sites. Through comparing the artworks’ introductory texts and the ways in which people interacted with these interactive art installations, the concept of “Ambient Interaction” gradually evolved. By elaborating the concept, it is inevitable that the mutable terms “Interactive Art” and “Public Art” will be prominent. It is important to state that, although the theme of discussion may suggest a redefinition or expansion of interactive art, the objective of this article is by no means to become entangled in debates about these widely contested definitions, but to highlight their foundations in order to discuss and elaborate upon the concepts of “Ambient Interaction”.

Over the past decade, interactive technologies and devices have become increasingly accessible to artists and designers alike. To some extent, this has encouraged the crafting and exhibition of
various interactive artworks, not only in art galleries and museums, but also in public sites, the latter of which is currently burgeoning. However, when a media-based art installation enters the public domain, it frequently encounters obstacles, among which two primary issues are particularly notable. Firstly, people in urban public places are often “involuntary audiences” (Senie cited by Knight 2008, 28), as they usually have other priorities in mind and have no explicit intention of engaging in an artistic experience. Boros (2012, xii) remarks that “art is in the public [which] means it reaches more people more often, and it often reaches people who may not normally seek out art”. Secondly, in public spaces it is inevitable that artworks will have to compete with other omnipresent media and digital devices/environments. In such cases, people’s attention can be significantly distracted, with many failed attempts at engaging potential audiences. Müller et al. (2010) point out that “many displays seem to fail to attract enough attention of passersby, simply vanishing in the cluster of things in public spaces that compete for attention”. Moreover they also claim that “if public displays fail to attract enough audience attention however, they may not be used at all” (Müller et al. 2010).

The above two challenges have prompted various efforts to study interactive public displays with the objective of eliciting people’s attention at appropriate times, provoking motivation, sustaining each experience, facilitating a utilisation of digital interfaces and/or furthering the observers interpretive engagement (e.g. Brignull and Rogers 2003; Petersen et al. 2004; Huang, Koster, and Borchers 2008; Müller et al. 2010; Tikka et al. 2011). Among these, many were human–computer interface (HCI)-based studies, with the majority focused on the usability and effectiveness of navigating interfaces in order to assist users in obtaining information accurately and without frustrating delays. Sundar, Xu, and Bellur (2010) indicate that “HCI researchers have long demonstrated the powerful influence that modalities of interaction have on humans.” This, however, may not agree with artists’ interests and intentions, as they often “make works that fail in every way imaginable intentionally” (Paulos 2007). Bialoskorski, Westerink, and Van den Broek (2010) reinterpreted the argument of Höök, Sengers, and Andersson (2003) stating that evaluating this kind of interactive systems is common in human–computer interaction (HCI), but it is not common to test interaction in art. This is because HCI evaluation strives to be objective, while in art it is all about the subjective opinion of a single observer. [sic]

Edmonds (2011), in his article, Art, Interaction and Engagement, writes, “the behaviour of the works is not intended to always be obvious, so that if you continuously try to force a response by waving it might result in a period of quiet”. In such cases people may misunderstand, thinking instead that the artwork has malfunctioned, however it may sometimes be a part of an artist’s strategy to disrupt conventional patterns of response and expectation. Artists might therefore be prepared to forego the engagement of some less-attentive audience members in preference for the occasional viewer/participant who makes a deeper or more rewarding connection with the work.

Nevertheless, a divergence between HCI and art research/creation may not be inevitable. Höök, Sengers, and Andersson (2003) have argued that HCI methods can offer benefits which may improve the creation of interactive artworks. In addition, according to Ciolfi et al. (2005), “in the past decade or so, the field of HCI and interaction design has become less defined by an explicit work orientation regarding the design of technology, and is increasingly concerned with issues of fun, enjoyment and aesthetics”. Edmonds (2010) also remarks that, “the knowledge of HCI and its methods can contribute to interactive art making”.

It is not the aim of this work to set up a false opposition between HCI and art research. Rather it is our intention to highlight a phenomenon of the research pertaining to interactive artworks, particularly, the interaction between artworks and people which, to some extent, bypasses a vital aspect of the relationship between artworks and
other ambient causal mechanisms and influences. This subtle but important oversight may result from the fact that the definitive characteristic of interactive art is commonly thought to be its direct interaction with people. However, when artists create work for public venues, especially those not specifically dedicated to the presentation and display of artworks the resulting work becomes subject to transformations on a number of levels simultaneously, often with unanticipated consequences. A well-known example is Richard Serra’s public sculpture “Tilted Arc” (1981), which itself became a catalyst for positive aesthetic awareness, social interaction and the usability of Federal Plaza, whilst also encountering substantial criticism and resistance. Although its demolition was largely due to political sovereignty rather than public autonomy, it was portrayed negatively as a “sullen blade”, an “eyesore” and an “iron curtain” (Knight 2008, 9), which ultimately led to its unanticipated removal from the site in 1989 (Hein 1996; Horowitz 1996).

Based on in-depth literature reviews on interactive art and art in public spaces, along with field studies of interactions between interactive artworks, and people with their surroundings, the following sections progressively elucidate the concept of “Ambient Interaction”. It is expected that the arguments raised in this article will both facilitate and suggest a broader understanding of the unique and sometimes delicately nuanced characteristics of interactive art, so as to enable more fruitful and diverse interactivities in public space.

2 Widespread recognition of interactive art

A significant amount of literature takes direct interaction and conscious influence/agency (Murray 1997) as being definitional of interactive art. Popper (2007, 181) remarks that in interactive digital installations, “interactivity can be interpreted as the ability of the user to manipulate and affect one’s experience of the media directly, and to communicate with others through media”. Bilda, Bowman, and Edmonds (2008) note that “interactive art invites the audience to engage through interaction and, in doing so, participate in the realization of the work itself”. Moreover, Kim and Kim (2012) claim that “interactive art is not successful if the audience engages in no further interaction with the work”. Heinrich (2011) also states that, “in interactive art, the onlooker has finally become a participant physically acting and reacting within the timely and spatial framework of an interactive art piece”. There are a great number of references underlining the fact that a participant’s physical intervention within the process of interactive art fulfils a fundamental role in terms of the satisfactory realisation of interactive artworks (e.g. Rokeby 1995; Sims 1997; Ascott 2000; Rogala 2005; Dezeuze 2010).

In addition, many researchers and artists further assert that the greater quality/value of interactive art is manifested when physical and intellectual aspects are fulfilled. For instance, Holmes (Ascott 2000, 90) states, “the interactive art experience is one that blends together two individualized narratives. The first is the story of mastering the interface and the second is about uncovering the content that artists bring to the work”. Kravagna (Dezeuze 2010, 241) argues that “interactivity goes beyond a purely perceptual proposition in that it allows for one or more reactions to affect the work—usually in a momentary, reversible and repeatable manner—in its appearance, but without fundamentally changing or co-determining its structure”. Without people’s physical participation, or in the face of inappropriate responses, artworks may often be deemed to have missed a vital piece of the jigsaw, or even to have failed outright (Edmonds et al. 2004; Knickmeyer and Mateas 2005).

Regardless of whether the above arguments rest upon the interactive installation’s function in facilitating interactivity—of which the participant’s involvement is fundamental—the intervention and involvement of people is regarded as an indispensable element in the actual fulfilment of an interactive artwork. Indeed, a great number of interactive art installations have been devised with the primary intention of interacting with people, and only through such interaction can the
artistic intent be accomplished. (Although it is recognised that other important aspects of the work may mitigate deficiencies in interaction.) This conventional interpretation of interaction may be a product of prevailing—and we argue incomplete—interpretations and definitions, which are frequently reflected in both the research and creation of interactive art.

Since very little literature has tapped into the realm of the interactivity occurring between artworks and other causal mechanisms/environments, this prevalent attitude towards interactive art may have restricted or overlooked a subtle yet important characteristic of interactivity as a creative medium. However, when considering interactivity in the wider frame of reference that we advocate, specifically regarding broader environmental factors in addition to direct human agency, the possibility, variability and creative potential of interactive artworks can be dramatically expanded. In addition, the critical appraisal of these artworks is facilitated in ways that encourage nuanced discussion of causal influences and encounters that contribute significantly to the understanding of interactive artworks in public space and to the factors that augment and enhance their reception and appreciation.

3 Interactivity—a creative medium

In 1977, Myron Krueger coined a term, “response is the medium”, in his influential publication Responsive Environments. In this article he states: “interactive art is potentially a richly composite medium quite distinct from the concerns of sculpture, graphic art or music”. Already then, we see the defining characteristic of response being promoted in opposition to “the traditional concept of a medium emphasizes the physical properties of a particular material” (Manovich 2001). In traditional art disciplines, artists often resort to art materials and static art forms as the communicative media to embody their ideas. Interactive artists meanwhile present their ideas through physical but nonetheless immaterial interactions. As such, the interactivity itself comes to figure prominently as a medium in its own right, just as paint serves as a medium for painting. According to Larsson (2011), interactivity is often presumed to be an intrinsic quality of the new medium. Sundar, Xu, and Bellur (2010) emphasise, “interactivity as a medium feature comes in the form of different modalities of information dissemination”. In addition, Edmonds (2010, 263) states that:

Interactive art is as valid as any other [art] form. In making it, the artist deals with the same issues and faces much the same challenges as in any other kind of art. However, each form and each medium has its own set of specific problems and this one is no exception.

Unlike traditional art forms, interactive art is characterised by its temporal interactivity rather than its static material qualities; it is embodied as a composition or an integrated art presentation of hybrid materials, technology, media and time. Interactivity is therefore, in itself, multiform in its unique attributes, and thus, it can be conceived as a compound creative medium in which a variety of materials, processes and forms unite. The “medium is the channel through which the content is shared” (Sundar, Xu, and Bellur 2010). The sharing and exchange process in this discussed context traverses the boundary of people and artworks, and is broadened to the interrelations among artworks, other non-human agents and environmental influences. Through the course of sharing and exchange, the meaning of art is manifested—transacted—even. Dewey (2005, 298) proposes that, “A medium as distinct from raw material is always a mode of language and thus expression and communication.” Müller, Edmonds, and Connell (2006) claim that “meaning occurs through the process of exchange, and interactivity itself is the very medium of the work”. With the purpose of improving the creation of interactive artworks, Höök, Sengers, and Andersson (2003) conducted an interactive experiment and published the findings in Sense and sensibility: evaluation and interactive art. In this article, they explained that “artists tend to think of their systems as a medium through which they can express their ideas to the user”.

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Of course, interactivity does not exist solely in interactive art, it is also utilised in other traditional and contemporary art forms. However, despite the fact that the literature, in different research contexts, attempts to arrive at a definitive explanation of the word “interactivity”, there often arises significant disagreement and contradiction (Down and McMillian 2000). On this subject, Kravagna (Dezeuze 2010, 241) notes that “the boundaries are permeable, and that rigid categories are not useful”. It is therefore evident that using this term without defining it in a specific context can lead one into a quagmire of debate. Thus, for the purposes of clarity, the focus of this article is on interactivity as a medium of art production: through interaction with causal agents (including humans) and unpredictable environmental influences, often unexpected yet significantly important associations and meanings are generated which can both enhance and occasionally detract from the overall artistic achievement. Human intervention should nonetheless be considered as one, among many types of interactive stimuli.

4 Art of interactivity in public spaces

Hein (1996) states that “conventionally the term Public Art refers to a family of conditions including the object’s origin, history, location, and social purpose”. He (Hein 1996) continues, “Yet today’s public artworks still have a conceptual link with traditional art presentation.” Despite the fact that recent decades have witnessed diverse new forms and approaches towards public art, a substantial quantity of public artworks, including interactive artworks, continue to adopt traditional approaches, and have been selected for public sites with the purpose of reflecting craftsmanship, aesthetic quality, and the history and cultural identity of a specific location. For instance, the work Listening Post (Hasen and Rubin 2002) was designed to explore “the magnitude and diversity of online communication”, and the artists’ “goal is to distill the content and the structure of this collective communication and to present in ways that are accessible and compelling” (Hasen and Rubin 2002). Without the unwitting and indirect interaction of anonymous participants, the project would be impossible. There have been many prominent interactive installations created along the same vein, such as Cybraphon (Found 2009) and Metroscoopes (Metroscoopes 2003). The latter being a permanent installation and has been displayed in an open public place (in central Liverpool, UK) since 2003. All the above works involve public agents that indirectly respond to a physically present individual or group. It is important to note that the role of the human here equates to an environmental factor, and although there may not be direct involvement per se, without their intervention the art remains incomplete. Thus in such a setting, a human not only contributes to the aesthetic interaction (although indirectly) but is also the audience. As Selwood (1995, 124) states, “the users of a space are also its producers; without their agency a place lies dormant, awaiting human interactions and interventions to shape it”.

Due to their well-known identities and status as digital art, the above three interactive artworks are included here as exemplars, particularly because their sources of interaction issued directly from the Internet, a context widely—but not unproblematically—regarded as a new form of “public space” (Knight 2008, 38–39). These examples not only help frame a parameter for the research concerning indirect interaction with humans and other environmental influences, but they also aid the conceptualisation of “Ambient Interaction”. We are aware, of course, that Listening Post was awarded a Golden Nica in the interactive art category of the 2004 Prix Ars Electronica and may therefore be regarded as a contentious case (Huhtamo 2004). Nevertheless, we argue that it represents a highly pertinent example by revealing shifting attitudes not only towards the meaning of the term “Interactive Art”, but also towards “Public Art”. Unlike these three paradigmatic artworks, a prevalent notion of interactivity in the field of interactive art views direct interaction with people as the prime or even exclusive approach for realising an aesthetic interaction. In this view, it is only through direct interaction with people that interactive art can be fully
appreciated. However, this widespread recognition of interactivity may underestimate the possibilities of interactivity as a creative medium, and subsequently undermine the potential of openly exhibited artwork, in particular.

Whenever artworks are presented within public spaces, they are invariably accompanied by various artistic purposes, responsibilities, and/or functions. Upon those conditions, a direct interaction with people may not be prioritised because drawing attention, eliciting curiosity, triggering motivation and prolonging physical engagement with audiences may not be the artists’ primary concern when conceiving or creating a public artwork. Knight (2008, 22) notes that many artworks are completely absorbed into the surroundings they literally escape notice as art; they nudge at and whisper to us that we perceive their effects in subtle ways. Other works scream for our attention; unwilling to be mitigated by site or circumstance. They insist we pay them mind.

The former type of public artworks merges into their environments, quietly settling where they are installed, while undergoing interplay with their surroundings implicitly. Through modest interactivity, the features of the space are enlivened, the quality of the space is improved and so the transformative potential of the art is realised. We suggest that the same principle of implicit interplay would prove valuable if taken into consideration when applying interactivity as an artistic component in the creation of public interactive artworks.

5 Case studies—the three interactive artworks

An initial intention for the field observation was to select suitable artworks for the analysis of
interactivity between participants and interactive artworks. The purpose of this observation was to further examine the first author’s analytical framework that is used as a conceptual research tool, with the end goal of enhancing artistic interactions and facilitating meaningful interactive experiences (Her 2011, 2013). Through the course of artwork selection, the concept of “Ambient Interaction” emerged without prior expectation. With the aim of providing a condensed argument for “Ambient Interaction”, three (permanent) interactive art installations in Taiwan have been selected. The locations are as follows: one on the façade of an industrial building at Zhongli City, one in the Taipei Mass Rapid Transit (MRT) and one at the Taoyuan international airport. The related concepts are further delineated in this section.

*Between Moving and Still* (Figures 1 – 3) made by a Taiwanese artist, Huang Wun-Cing (Taipei Public Art 2012a), is a sound- and light-based interactive installation that has been exhibited on the façade of Taipower Zhongli, Zi Li electrical substation since 2010: a functional, contemporary building in the typical plain, grey, cubic, architectural style of electrical substations in Taiwan. The sound-based interactive LED artwork was created with the purpose of reviving the space and enhancing the overall impression of the power substation. This artwork consists of 147 pieces of 2.8 cm thick handmade stained glass and LED lights. The interactive mechanism was designed to respond to environmental sound to control the sequencing of LED lights (i.e. the higher the volume the taller the illuminated strip). When differing levels of sound are detected, a dynamic and colourful LED display is triggered.

*Fast or Slow* (Figures 4 – 6) made by a Japanese artist, Koichiro Miura, is also an LED-based interactive artwork, and has been displayed on the wall surfaces of a main corridor leading to the station concourse in the Taipei MRT (Nangang Exhibition Center Station), since 2011.
This artwork is comprised of LED light bars, infra-red sensors, and aluminium plates. The LED illumination patterns and durations are influenced by passers-by who walk at a predetermined distance and pace. Three modes of LED light performance are intended to symbolise different relationships between people, environments and societies. For instance, “When a passer-by walks along the wall on either side, the LED panels near him turns on and off, which represents his social participation” [sic] (Miura 2011). Additionally, the static images of tree and water on the walls above and underneath the LED bars also suggest symbolic narratives; the overlaid multiple branches figuratively depict an intricate social system, while the water ripples are intended to imply the fluidity of social relations (Miura 2011).

The Flower Clusters (Figures 7–9), also made by a Taiwanese artist, Allen Tao (Taipei Public Art 2012b), has been exhibited at the Taoyuan international airport (terminal two) since 2012. This art installation has physically separate input and output components. The input console (see the red circle in Figure 7) is an LED screen with a digital camera mounted at its top edge, which is attached to the wall at a participant approachable location, several metres away from the output component. The output is incorporated into a stainless steel sculpture in the form of a blossoming flower, with each petal comprised of an LED monitor. On most occasions, the input console shows the introductory information for the artwork (Imgur 2012), while the flower sculpture operates autonomously as a kaleidoscope, randomly displaying elaborate colourful patterns. Occasionally, the input console displays surrounding images, and when these appear, any participating individuals can choose to have their image captured, by pressing a button below the screen. The captured images are then multiplied and blended into the petal-like screens on the flower sculpture. By means of fusing colourful patterns.
along with the images of people, the stated intent of the artist is to exhibit a “great vision of man-oriented coexistence with all things” (Imgur 2012).

6 Field observations and unstructured interviews

Our method of analysis was grounded in an ethnographic approach, including participant and non-participant observation. According to Bochner and Ellis (2003), the viewer’s perceptions are as important as the artist’s intentions, thus we considered the artists’ intent as well as how people interacted with the art installations in situ. The method is frequently utilised in researching interactive experiences (e.g. Morrison 2010; Morrison, Viller, and Mitchell 2011). Graham (1997) points out that observation seems to be the most appropriate approach in tackling such research. Edmonds, Bilda, and Muller (2009) remark that “the best way to gather information on such interactive behaviour is to observe, analyse and learn from various audiences’ experiences as they occur in real-time”. The field observations were conducted in urban, public places in Taiwan between June 2012 and January 2013, along with unstructured interviews with people who had glanced over or stopped to watch the artworks. The authors’ subjective evaluation of these works is presented in the following sections.

In consideration of interactivity as a creative medium and the fact that artworks in public spaces are often endowed with diverse purposes, we attribute indirect or inadvertent interaction in this research context to have the potential for revealing unexpected and unforeseen qualities and associations. Instead of detracting from the work or undermining its intended use or meaning, such discoveries contribute to its reinvention and/or reinvigoration.
Indeed, although a direct and intentional intervention from people can be important, this may not be necessary in realising artworks that can embody interactions with ambient conditions such as wind, light, sound, temperature and other forms of unintentional human-driven interaction. Miwon Kwon (2004, 67) states that public art is not simply an autonomous object—it is in part formed through interpretive dialogue and its relationships with the surrounding environment.

*Between Moving and Still* is one such artwork, as its interaction is based on different magnitudes of sounds from ambient sources, for example, a louder sound drives taller LED light displays or vice versa (Figures 1–3). In the daytime, the glass glimmers and the LED lights are barely visible, but when night falls it comes to life and the interactive presentation is then primarily triggered by the sounds of passing cars. In this instance, people did not deliberately engage with the art to manipulate the light performance. However, indirect non-intentional human interaction was inevitably the source of implicit ambient interactivity. According to the artworks’ introductory statements (Tai-power 2013), a power station represents the foundation of technology, and therefore, by means of employing interactivity—even if generated at one move—as the creative medium to this art installation, it highlights both the architectural features of this specific institution, and the fact that electricity is an inconspicuous, yet necessary source for establishing an urban social ecology. The presentation of this art piece figuratively portrays an implicit and inseparable relationship between people, the environment and electric power.

*Fast or Slow*, on the other hand, responds to the movement of passers-by as a direct source for the interactive performance, thereby displaying its stated artistic intention of evoking a delicate
interrelationship between people, environments and social systems. However, within this interactive performance, a spontaneous and conscious engagement from participants is believed to be essential. According to Koichiro Miura (2011):

The sensor operates the LED panels located 1.2 meters away so that the passer-by sees the panels in front of him turn on, which intends to arouse the emotion of chasing the light (task, duty, achievement). When he walks in the opposite direction, the panels behind him turn on to arouse the emotion of being chased by the light. The LED light turns off in about two seconds indicating the frequent changes of the social system.

Nevertheless, during the several field observations, we observed no-one stopping to watch the movement of the LED bars nor chase the LED lights. The Flower Clusters exhibits an autonomous, vivid, kaleidoscope-like performance. By incorporating people into its interactive display, the intention is to manifest a creative notion of a pleasant and diverse cultural landscape. In order to achieve this objective, attracting the curiosity of the public is crucial, so as to motivate the audience to seek out the image-capturing device. The main flower sculpture is hung beneath the ceiling, in a prominent location, where people pass and gather to wait for their relatives or friends to pass through the arrival gate. Due to the contemplative mood of the observers, we observed that people were often attracted by the scale and floral design of the artwork and its randomly changing images and colourful patterns but not by its interactive mechanism. We conducted several unstructured interviews with people who had stopped and watched the flowing patterns on the petal-like screens; however, none of them noticed that the artwork was an interactive installation.
7 Findings

The methodology adopted in this research is based on an ethnographic approach, “where the aim is not with theory building, as such, but rather respecification: a retelling that articulates practices in situ” (Suchman 2007, 177) in particular circumstances and public settings. During the field observations of the three artworks and their potential audiences, not a single individual was observed as having spontaneously sought or attempted to discern the input devices to manipulate the output effects of the interactive presentations, neither had any individual played with the artwork displays. In examining the presentation of the artworks, the artists’ intentions, the activities within the surrounding area, as well as the behaviours of people towards the three selected artworks at the scenes, we identified that the absence of awareness and direct participation can dramatically affect the realisation of the stated intent (although, obviously, the artist’s stated intent is rarely conditional to the overall achievement of any artwork).

As was clear from the field observations, yet in contrast to the artist’s stated intent, we conclude that people were the indirect source for the interactive display in Between Moving and Still, as the surrounding sounds were inadvertently produced by them, consequently triggering the diverse LED light performances. Although the passing motorists were unaware that the sound of their cars directly influenced the LED light display, nevertheless, their daily activities were the stimulus for generating an aesthetic change in the building. In this case, conscious awareness and motivation were not crucial elements in, nor mediating factors of, the interactivity. The interactive mechanisms of this artwork are similar to the above three paradigmatic artworks (Listening Post, Cybraphon and Metrosopes), in that the source of interactivity is inadvertently obtained. The former exemplars respond to stimuli via the
Internet, whereas *Between Moving and Still* relies on surrounding sound levels. They all engage specific effects and associations, and visualise the interrelationship between people and the environment. Moreover, they not only embody the features of interactive art, but they also realise the stated artistic intent as well as further unexpected or unpremeditated associations that may invite contemplation and aesthetic engagement.

According to the artist who created *Fast or Slow*, a physical and conscious intervention from people is a vital element in manifesting the aesthetic interaction of this artwork (Miura 2011). However, perhaps due to the ubiquitous nature of computing media in such public contexts, and the fundamental function of the space as a connecting corridor to a transport hub, people in the space behaved indifferently to the display of the LED light bars. In general, they passed through the area without pausing or even glancing at the artwork. Thus, in comparison with the artist’s statement, although their movements and activities within the space were registered as an indispensable component of the interactive display, without conscious participation the artwork may not be fully realised.

Similarly, in *The Flower Clusters*, a spontaneous intervention from people is necessary to fully unfold the aesthetic qualities of this interactive installation. Through observation of participants and non-participants alike, and unstructured interviews with people on site, we discovered that many people were attracted to the bright and vibrant images, and many took pictures of the flower sculpture. Apparently, their attention had been caught, which is important if “aesthetic interaction aims for creating involvement experience” (Petersen et al. 2004). According to Müller et al. (2010), attracting attention is the first threshold in terms of constructing a successful interactive experience in a public context, followed by
raising curiosity and eliciting motivation so as to sustain a long-term engagement. However, none of the observers or interviewees had discerned the interactive feature of this artwork. We ascribe two major factors that led to their lack of awareness regarding the interactivity of this installation: firstly, the display of people’s images only appears occasionally (and only for a few minutes on each display). Secondly, the image input console is installed at a distance from the main flower installation, and also the design of the input console is stylistically unrelated to the output component. Based on these issues, we conclude that the intended interactive element of this artwork was not fulfilled, although people’s attention was held for subsidiary reasons.

8 Summary

Unwitting human interaction was the key trigger of aesthetic change in all three case studies, nevertheless the outcomes were very different in each individual piece. Interactivity was employed in Between Moving and Still and enabled the LED strip (Figures 1–3) to respond to the fluctuating auditory environment, including people, although rarely, if ever, through direct involvement. Through this implicit interaction, the intention of the work remained available for interpretation. In the cases of both Fast or Slow and The Flower Clusters, whilst the forms of interaction were not those primarily intended by the artists the works incorporated sufficient parameters for effective engagement and interpretation in other relevant respects. Nevertheless, when in the public sphere art encounters various challenges, among which involuntary audiences are perhaps one of the most significant. The former artwork (Fast or Slow) appeared to go unnoticed by passers-by, which may be attributed to the fact that it had been positioned in a thoroughfare and had no clear incentive for people to initiate an engage-

Figure 9. The Flower Clusters—the display of colourful patterns.
ment with the interactive elements. The latter art installation (the Flower Clusters) overcame the first threshold and successfully caught people’s attention (Müller et al. 2010); however, it appeared incapable of directing audience members to appreciate/experience its interactive characteristics. Thus, the creative/interactive potential of both Fast or Slow and The Flower Clusters is, to some degree, not fully realised. This was perhaps due to the artworks having been created with the primary intent of arousing direct interactivity with people. The prevailing notion of interactivity in interactive art is that a direct and conscious interaction with people is indispensable, otherwise the purpose of interactive art may not be regarded as having been fully engaged. However, if one relinquishes this specific expectation and applies alternative interpretation of what interaction may entail or achieve in a visual art context, the creative potential broadens, as the works Between Moving and Still and the three paradigmatic art installations illustrate. By contrasting the stated intent of the artists with field studies and literature reviews, the concepts of “Ambient Interaction” and “Interactivity as a creative medium” have emerged. Although these concepts may help expand the creative scope of artists and art practitioners, we wish to emphasise that these comparative findings are by no means the sole determinant of success, nor do they establish a comprehensive manifesto of what constitutes an artwork’s eventual success.

9 Conclusions and further studies

It is evident that interaction plays a key role in the discussed art genre; however, it may not be necessary to exclusively or directly interact with people in order to realise the artwork. Instead of claiming a new concept of “Ambient Interaction”, it is perhaps more appropriate to say that this article proposes an expanded conceptualisation of interactivity as a creative medium. We value and appreciate artworks in the light of their capabilities when promoting interactivity. Nevertheless, we consider that the interactivity in the realm of interactive art can be presented with more dynamic approaches, which do not necessarily need to be confined to direct action between artworks and people, but can be more flexible and broadly involved with other environmental attributes for the realisation of the artistic potential.

Rather than insist on the generation of ideas as a result of direct interaction between artworks and people, we argue that a creative process would benefit from a broader awareness of not only whom, but also what their artworks will encounter within the assigned space. In either case, interactivity has to be appropriately employed as a creative medium in order to display work to its fullest. Although the concept of “Ambient Interaction” initially emerged through field observations of interactions between the interactive artworks and people in public places, it might also be profitably applied to work which is intended to be displayed in other exhibition contexts. The commissioning and production of interactive artworks would gain much by observing that interactivity, as a medium of creative art, may be designed to respond to environmental influences or to ambient conditions, rather than a single direct channel of human interaction.

As “an increasing number of places are creating interactive public spaces through public art” (Urbantimes 2013), we are witnessing ever more interactive art installations displayed in public sites outwith conventional art spaces. This suggests that there is an emerging scene of commissioned works of this type in such public contexts, thus further research is crucial. In the next stage of this ongoing study, we aim to conduct more in-depth case studies with other interactive artworks in this manner, by interviewing artists and re-comparing their interpretations with the findings encountered in this article. We believe that further studies will inform the two key concepts (“Ambient Interaction” and “Interactivity as a creative medium”) raised in this article and subsequently provide more fruitful references for art practitioners who aim to engage a wider public as well as to provide expanded scope for the critical appraisal and understanding of the nuances and unique subtleties of interactive art in public space.
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