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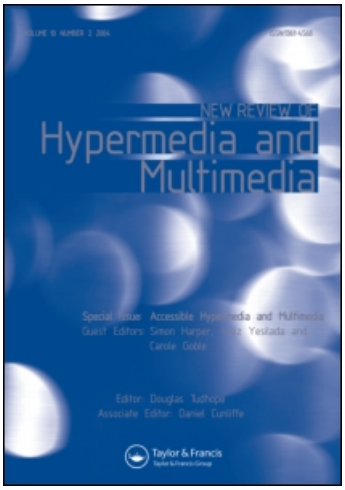

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Designing for playful photography

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This paper highlights the concept of *playful photography* as an emerging and important area for Human Computer Interaction (HCI) research, through bringing together three research projects investigating new ways of engaging with digital photography with theories related to playfulness and experience-centred design. Drawing upon this, we start to unpack playful photography and its characteristics. Instead of aiming for a unifying theory of photography related to experience-centred research, we take a reflective stance on our own research work. This is intended to encourage a critical discussion about playful photography, as well as support the on-going research in this area with a possible theoretical perspective.

Keywords: Playful photography; Experience-centred design; Design cases

1. Introduction

In this paper, we highlight and start to unpack the concept of *playful photography,* based on our experiences from designing and studying digital photography applications. We suggest this is an interesting design space that awaits further exploration as a research strand. We position playful photography in the history of photography both inside and outside of the HCI area and within the emerging experience orientation within HCI. Furthermore, the concept is discussed on the basis of three different design cases, all exemplifying characteristics that can be associated with playful photography. The characteristics of playful photography can be considered as a resource for others developing photo applications in this direction, but we do not claim that the list of characteristics is exhaustive. We see them as a starting point and as describing how playful photography can represent an activity that is done as an enjoyment in itself, how it can involve taking advantage of the physical or social surroundings, and be bodily engaging. Moreover, the characteristics show how such bodily actions can be social and involve co-experiences and, for example, how viewing pictures means that several people are physically active together.

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Photography became a mundane practice after the introduction of roll-film cameras, almost a hundred years ago (Wells 2004). Amateur practices and perspectives have interested both anthropologists like Chalfen (1987) and literature theorists like Sontag (1977). Chalfen studied how snapshot pictures of everyday life in the USA were possessed and valued, and what made people consider something to be a good picture. His studies led to questions about if and how people will create new photographic practices as novel technology, such as video, would become part of everyday life. Sontag has written about early significance of everyday photography, how it developed in tandem with tourism, and how, for example, the camera was used to memorialise special events and could be experienced as having something to do in a new situation. Along with Barthes (1982), a twentieth century French literary theorist and sociologist, these authors often discuss photography from the perspective of the resulting pictures, what they picture, why and how people value them.

With the advent of digital photography, photography has become the subject of HCI research, now involving a perspective of how people manage their pictures on computers (Frohlich *et al.* 2002). Some of this work has been situated within a "usability paradigm" seeking to optimise the handling, storing and organisation of the photos; focusing less on the experiential aspects of photography. However, in recent years, we have also seen a number of investigations on how to design for new photographic experiences in HCI. This strand focuses on playful, creative and aesthetic practices surrounding digital photography rather than on optimising the usability, efficiency or technical quality of digital photography.

We have worked independently within this strand, more specifically on designing experience-oriented photo applications beyond the desktop, seeking to explore alternatives (Gaver and Martin 2000) to current applications for digital photography. Our theoretical starting point has been the concepts of homo ludens (Huizinga 1955) and ludic engagement (Gaver *et al.* 2004). In addition, the emerging experience-centred perspective grounded in pragmatist aesthetics (McCarthy and Wright 2004, Petersen *et al.* 2004) has informed the design processes. In a number of projects, we have designed for playful and engaging experiences with digital photography taking advantage of ubiquitous computing technologies. The result of this research has been the development and trial uses of three digital photography applications. Bringing together these research experiences it becomes clear that there are several strong similarities with respect to both design intentions and the experiences from field trials. As a result, we want to highlight what we consider to be "playful photography". This is an emerging research strand that deserves special attention, as digital photography is already a ubiquitous technology and this specific design space is currently not very widely explored, yet complementing other kinds of photography research within HCI. Moreover, the notion of playful photography can be considered as its own strand within experience-centred design, providing a specific lens that may support researchers that are designing for other types of game or leisure activities, or even to support taking a new perspective of more traditionally designed work applications.

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2. Background

The following section will give a background to how digital photography has previously been approached in HCI, and more recently in experience-centred HCI. Except for providing a general overview of related work, it will help to point out how the previous work differs from what we consider to be playful photography.

2.1 Photography and HCI

Within the field of HCI, photography started to gain attention, as it became a digital technology. People were suddenly able to take lots of pictures at a low cost, and share these almost instantly with others, which both created new opportunities and challenges. A number of studies, therefore, investigate how photographs are managed and shared on computers (Frohlich *et al.* 2002, Rodden and Wood 2003), and how desktop applications could be designed to support such new photo practices (Voida and Mynatt 2005, Kirk *et al*. 2006). Kirk *et al.* (2006) have identified "photowork" as the management of a picture collection done after capture and prior to sharing. Photowork includes downloading, selecting, organising, editing and filing pictures, primarily done to prepare not only for sharing but also for other purposes. Photowork is often complex and time consuming, and Kirk *et al.* (2006) suggest a need for making new software tools to make pre-sharing activities easier and more enjoyable. Overall, the early focus on photography in HCI was how to design tools for people to manage large amounts of digital images more effortlessly and efficiently, and share them with others.

With the advent of camera phones, researchers has taken an interest in communication and photography, for example, investigating the reasons for taking pictures with and sharing pictures from mobile phones (Kindberg *et al.* 2005, Van House *et al.* 2005). As shown in these studies (Kindberg *et al.* 2005, Van House *et al.* 2005), people take and share such pictures for a number of different reasons, such as taking an image as a reminder for oneself, as a visual part of an on-going discussion with friends, or as a way to express oneself to others. Recently in HCI, there has also been an interest for photo-sharing and social network sites like Flickr, and what motivates people to share their pictures there, and even tag them for various purposes (Ames and Naaman 2006).

Along with improved mobile and sensor-based technologies, there has also been an interest within the HCI field to move away from the desktop and design photo/video applications that take advantage of aspects of the physical world. Rather than using sensors to create bodily engaging applications, several of these designs have had a predominant focus on tasks, such as making browsing easier for people. For instance, LAFCam used sensors to detect laughter and automatically mark a video sequence as interesting, in order to facilitate for the user to later find the "fun" parts of a recording (Lockerd and Mueller 2002). StartleCam also used different sensors to automatically trigger

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a wearable camera when the user gets excited or aroused (Healey and Picard 1998). In a similar way, SenseCam originally used a number of sensors to automatically trigger pictures to be taken; with the intention to support people with distorted memory (Sellen *et al.* 2007).

2.2 Experience-centred HCI

The emerging field of experience-centred HCI emphasises that technology is much more than usability, efficiency and utility. Technology has become a part of our everyday life and we react to it emotionally, intellectually and sensually; aspects that we need to understand and consider when designing technology (McCarthy and Wright 2004). This approach acknowledges, for example, that technology is not only a part of our work lives, but also strongly integrated into leisure and enjoyment, which fundamentally affects how we should design and study technology (Blythe *et al.* 2004, Gaver *et al.* 2004). In leisure applications, for example, it is often not the most efficient and fastest road to a goal that is interesting, fun or satisfactory for the user, but the road that allows exploration and creativity. In order to explore ways, technology could support a broader range of values such as play, exploration and personal reflection, Gaver (2002) has been working with the concept of ludic design. Ludic design is influenced by Huizinga's theory of play, which argues that humans are inherently playful creatures who want and need to engage in activities that are not related to utility, duty or truth (Huizinga 1955).

Forlizzi and Battarbee (2004) have stressed that experience need not be an individual thing only. They challenge the assumption that experience is seen as entirely private and subjective, as argued in some areas of experience-centred HCI. They suggest co-experience as the experience created through social interaction and point to creativity in collaboration as potentially contributing to co-experience. Whereas Forlizzi and Battarbee focus on establishing a framework for experience and co-experience, our interest lies in designing for engaging individual experiences as well as co-experiences.

2.3 Photography and experience-centred HCI

There are a number of photography projects within HCI that, we argue, have been experience-centred in design. What is common for these projects is that they try to open for new experiences of capturing or viewing photographs that have little or nothing to do with efficiency or ease of use. In doing this, they differ from the previously mentioned efforts in HCI to support, e.g. photowork (Kirk *et al.* 2006). We argue that the following examples are related to, or even belong to, the notion of "playful photography" that we will outline next.

An early example is Audiophotography, in which Frohlich *et al.* (2000) explored ways of using sound to add value to still images. In Audiophotography, a sound clip is recorded along with taking a photograph, and then played when viewing the image. Based on the concept of Audiophotography, Martin and Gaver (2000) further explored speculative design proposals for digital camera

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technology that illustrated intriguing, playful, or provocative ways of taking pictures. In a similar way, Bitton *et al.* (2004) explore in the project RAW how sound can alter the act of viewing pictures. RAW is a novel photo-viewing application that plays sound automatically taken at the moment of capture. A more recent example is Columbus (Rost *et al.* 2008), which is a photo application for exploring geo-tagged images by physically going to the places they are located. Columbus is inspired by old-fashioned adventures of discovering unknown territories, and is deliberately limited to show only local pictures so that the user gradually "discovers" the physical and digital worlds as she moves around.

Applications supporting more playful approaches to digital photography are thus emerging, and are in this way promoting qualities that were already recognised in roll-film cameras, but which so far have been relatively unexplored in the digital realm. We see ourselves as contributing to investigating playful approaches to digital photography by taking advantage of the properties of the digital material in developing innovative design concepts, as well as seeking to elicit the more generic qualities of playful photography. However, it is important to stress that even designs that are not originally intended for playful use can obviously allow this, depending on what the user wants to do (Ljungblad 2009). In the same way, existing commercial applications such as Flickr (www.flickr.com) and Facebook (www.facebook.com) also allow for playful uses and purposes, even though they lack some of the characteristics that we outline in this paper as being important to playful photography.

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3. Three examples of playful photography

Below, we will describe three different photo applications that illustrate properties of what we consider to be playful photography. We briefly describe their functionality, design rationale and user experiences from field studies. The three applications have been developed independently from each other, but there are striking similarities as well as some interesting differences between them that motivate the notion of playful photography, which we explore and develop in this paper.

3.1 Context photography

Context photography allows photographers to take pictures of not only light but also of movement and sound, which creates different real-time visual effects in the pictures depending on these conditions in the immediate surroundings (Håkansson *et al.* 2006, Håkansson and Gaye 2008, Håkansson 2009). The Context Camera, which is an application for camera phones, uses the built-in microphone and camera to sense sound and movement, respectively, and then maps this information to graphical effects that affect the picture in real time (see Figure 1). This means, for instance, that being in a setting with lots of noise and action will create different visual effects in the

Figure 1. Context photography implemented on a camera phone (left), photographs with visual effects created by sound and motion in the moment of taking pictures.

photograph, than if it had been taken in a quiet setting. Context photography thus differs from Audiophotography (Frohlich *et al.* 2000) in that sound and movement are visually affecting the appearance of a picture in real time, rather than being associated as an audio or motion clip with the still image.

Context photography allows for completely new ways of taking digital pictures, where the photographer might take pictures of moving objects and/or noisy settings to create aesthetically pleasing pictures with these visual effects. The photographer can also actively create sounds or movement, or ask someone to participate in making noise or movement in order to get an interesting picture. The Context Camera illustrates how the use of sensor technologies can create opportunities for new applications and modes of interaction for digital cameras, which can encourage new creative and playful photo practices.

The design process of Context photography involved learning about engaging and meaningful photography experiences from a specific group of amateur photographers, called Lomographers (Ljungblad 2007). Their enjoyment and everyday practice of taking pictures were studied in order to inform novel playful photography experiences. The final design of the Context Camera was not intended for the Lomographers *per se*, but for people interested in engaging, creative and playful digital photography in general.

In a six-week study involving seven amateur photographers who used the Context Camera on their camera phones, we found that Context photography changed the perceived enjoyment of taking photographs (Håkansson *et al.* 2006). One participant described how using the Context Camera changed his way of taking pictures: "*You move yourself or the camera more. Spin it etc. just to try to get a fun effect*". We also found that users enjoyed not being in

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control all the time, and that unexpected results due to the dynamics of a setting was part of the fun: "*Much of the fun with context photography is that you feel you are not entirely in control over how the picture will turn out. The situation will determine this*..." As argued in Håkansson and Gaye (2008) and Håkansson (2009), the combination of explicit interaction (actively creating input) and implicit interaction (letting a certain environment create visual effects simply by being there) can invite playful exploration. How the pictures turn out also involves a moment of surprise. We suggest it is the combination of exploiting aspects of the physical environment, physical interaction, unexpectedness and visual effects that are ambiguous (rather than ready-made with a particular meaning and purpose) which makes this playful photography.

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3.2 Autonomous wallpaper

Autonomous wallpaper combines picture taking and home decoration (Ljungblad and Holmquist 2007). It introduces picture taking as a playful way to actively contribute to changing the interior design in the home. People can take pictures of everyday things with their mobile phones, send the pictures to the application, and let the colours and patterns in the images be transformed

Figure 2. Autonomous wallpaper lets users place pictures from their camera phone on their living room wall. Each pictures becomes a unique flower, growing dynamically with other flowers on the wall.

into a unique decoration on their living room wall (see Figure 2). For instance, it is possible to take a picture of green leaves intended to match the sofa, or take pictures of colourful patterns or people to create an outstanding and dynamic "party wall" when throwing a party. Users send pictures from their camera phones via Bluetooth or email and then position a flower on the wall by pointing the phone to a position where they want the flower to grow. Unique flowers with specific behaviour and appearance are then created from each picture, and they grow among and adapt themselves to other flowers on the wall, and can even create new flowers. Currently, the prototype is projected on a wall from a PC, and uses an ultra-sonic positioning system to allow the user to physically position a flower on the wall.

The design is grounded in studies of people owning pets such as lizards, spiders and snakes, and the kind of passive, yet everyday engaging experience that caring for such pets may involve (Ljungblad and Holmquist 2007). The joy in using Automomous wallpaper involves both caring for the interior design by planning and taking interesting-looking pictures, and waiting to see how the picture will appear as a flower on the wall.

3.3 Squeeze

Squeeze is an oversized interactive sack-chair which is intended as a site for collective and playful exploration of the history of the home as captured through the digital photos taken with a house camera (see Figure 3).

Figure 3. Squeeze. Pictures are taken through squeezing the camera; the pictures on the wall can be explored through physical activity in the chair.

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The design of the camera seeks to make picture taking possible and attractive for all members of a family, even for small children. As a picture is taken, it is immediately put on display on a wall close to the sack-chair. The pictures can be explored from the sack-chair through movement in the piece of furniture and through manipulation of the active zones on the sack-chair. It is possible to stretch and rotate pictures, and it is possible to navigate back and forth in history. The active zones of the sack-chair are deliberately distributed over the entire chair in a way that allows for collective control, and requires collaboration and physical activity in order to explore the photos. The physical shape of the over-sized sack-chair is designed to accommodate multiple people, its flexibility allowing for a changing number of people's presence adapting to the shifting circumstances of the home.

The furniture was brought into two homes for trial use. In general, the families were keen to engage with each other and explore Squeeze. While one father commented at first that the furniture looked more appropriate for a kindergarten, they were all engaging physically and actively in exploring the pictures, as exemplified by Figure 4 where a mother grabs her son's foot and bumps it into the sack-chair as a way of browsing photos. We were further surprised to see how a six-year-old boy started to take pictures of beautiful patterns in the home, for instance, close-ups of a patterned carpet, and then eagerly awaited its presence on the wall. The family members were also sometimes playfully fighting over control of the pictures, e.g. as one navigated forward in the pictures, another went back.

4. Unpacking playful photography

In the following, we will discuss a number of characteristics that we suggest are of importance to playful photography, based on our three designs presented

Figure 4. A mother grabs her son's foot and bumps it into the sack-chair to browse the collection.

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above. These characteristics are brought up to open for debate and support a further exploration of playful photography, and should not, therefore, be viewed as an exhaustive list of what playful photography is. Rather than attempting to define an overall framework that would include or exclude specific designs, we suggest that different photo-related designs may share one or several of these characteristics of playful photography, as well as include others that are different from the ones that we outline here. In line with the experience perspective furthered by Blythe *et al.* (2004) and McCarthy and Wright (2004), we see playful photography as something that can only be designed *for* but not be prescribed by design.

As argued above, designs that primarily focus on efficiency, for example, organising pictures in the most efficient way, would not be categorised as playful photography. Similarly, a camera intended to log the everyday life without any user involvement is not necessarily playful photography. However, it is important to acknowledge that such designs may still end up involving some elements of playful photography, if users start to explore and engage in playful ways beyond the designers' intentions.

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4.1 Part of mundane everyday life

All three designs are intended for non-professional settings in everyday life, and they represent different approaches to this. Squeeze is integrated as a piece of furniture in the home environment and designed to be appealing to all members of a family, including small children. Autonomous wallpaper is part of the interior design. Both Context photography and Autonomous wallpaper represent activities that can be done as a quick leisure in between other mundane activities. Snapshots can be taken, for example, when waiting for the bus, without allocating time for this as a separate activity. Thus, this is different from, for example, photowork and working with photo albums, which can be considered as a separate allocated activity rather than an in-between activity.

4.2 Activity as engaging in itself

Squeeze, Autonomous wallpaper and Context photography are all designed for exploratory activities that are done as enjoyment in itself. With Squeeze, the exploration of digital pictures is designed to be an engaging social and physical activity, with Context photography, the act of taking pictures is made novel and playful, and finally with Autonomous wallpaper, a novel playful display of pictures in physical space is explored.

Research on photowork has suggested that post-capture and pre-sharing activities should be made easier and more enjoyable (Kirk *et al.* 2006). These three playful photography applications focus primarily on novel ways of capturing and sharing pictures, and while photowork is not made completely redundant in these contexts, the need for it might be changed or reduced. In the case of Squeeze, for example, there is no work-process between taking a picture and sharing and experiencing it on the wall. In addition, since the intention to

take pictures changes in playful photography, people might not take the same amount of pictures or with the same frequency as with regular cameras used for, e.g. documentation. As a result of this, the need for photowork will probably be different and may not even be conducted or considered meaningful by the users when they engage in playful photography applications.

Moreover, the purposes of engaging with the prototypes are strongly related to activities that are attractive in themselves and thus detached from more task-oriented activities where the purpose is to "get the work done". For example, Context photography invites playful exploration of taking pictures with sound and movement as new parameters, Autonomous wallpaper invites playful exploration of taking different pictures as a way to dynamically decorate one's home, and finally, Squeeze offers a social site for sharing memories within the family.

Another characteristic, which our applications point to, is the issue of time efficiency. As argued by Kirk *et al.* (2006), there has been a tendency towards evaluating photo applications in terms of the time it takes to retrieve a photo. For all the playful photography applications we have developed and explored, time is not a critical issue in this way. On the contrary, the situations are characterised by excess time; of time spend with the purpose of spending time in an engaging and playful way, where the situation at hand becomes the purpose in itself. This is in line with the need for designing for pottering, as called for by Taylor *et al.* (2008).

The characteristic of having the activity as engaging in itself is also well in line with the experience perspective furthered by pragmatist aesthetics, which promotes curiosity, engagement and imagination in the exploration of an interactive system (Petersen *et al.* 2004). We see this in the trial uses of the systems in that, for instance, for Context photography it is argued that "*Much of the fun with context photography is that you feel you are not entirely in control over how the picture will turn out*" illustrating how curiosity and imagination motivates the engagement with the system. Similarly with Squeeze, the physical activity, which the interaction design invited for, contributed to engaging the families to investigate the digital photos, leading to the next characteristic of supporting bodily engagement.

4.3 Supporting bodily engagement

The designs in this paper represent applications that are mobile or beyond the desktop, and they take advantage of this by making use of the physical surroundings and bodily actions to open for playfulness and exploration. In Context photography, sound and movement have become new parameters, allowing the photographer to either create sounds and movement by bodily actions, or explore how aspects in the physical surroundings may affect the pictures by, e.g. seeking out a busy setting. With Squeeze, pictures are explored through shared physical activity with other people. With Autonomous wallpaper, users can physically "plant" flowers on their wall. As opposed to adding sensors to a camera for passively logging activities (e.g.

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Holleis *et al.* 2005, Sellen *et al.* 2007), playful photography applications exploit such technical opportunities to encourage bodily engagement from the user. This is in line with aesthetic interaction (Petersen *et al*. 2004), which also emphasises the value and potential in invoking the whole body and the senses in the interaction with technology. Furthermore, both Squeeze and Autonomous wallpaper also operate on a bodily scale in the way the pictures are explored. With Squeeze, the area with embedded sensors invites for engaging the whole body, e.g. the foot (figure 4) and even makes room for more than one person contributing directly to the interactive control and exploration, in this way supporting co-experiences (Forlizzi and Battarbee 2004). With Autonomous wallpaper, the pictures grow on the wall making it possible to relate to the contents of the pictures on a bodily scale.

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4.4 Moments of surprise

Context photography, Autonomous wallpaper and Squeeze all exploit "moments of surprise" as important parts of the overall experience. The Context Camera is deliberately designed so that the visual effects will not be displayed until the picture has been taken. If the effects would be constantly visible in the viewfinder, this might create specific expectations on each picture, and diminish the fun. Our field study showed that an element of surprise is essential in making Context photography exciting, and that the lack of user control that it brings with it can also be part of the fun (Håkansson *et al.* 2006). Similarly, in Autonomous wallpaper, it is difficult to foresee how a specific picture will turn out as a flower, which then leads to a surprise once the picture is sent to the wall. In Squeeze, the element of surprise lies instead in when and which picture will appear on the wall, which depends on how people engage with the sack-chair, e.g. by playfully counteracting each other's actions.

In contrast, an example where this kind of creative 'surprise' has not been taken in consideration is conventional digital cameras that give a warning when the lighting is not appropriate or the picture might get blurred. As Dunne (1999) critically argues, this is "*as if to warn the user that she is breaking the norm and is about to become creative*".

The applications in this paper further illustrate how lack of control can be part of an engaging experience. In all three examples, the relationship between the process of capturing a picture and the "resulting" picture is subject to exploration, and this is part of the enjoyment itself. For example, in Context photography the surrounding sound and movement are not necessarily possible to control. However, this can still be perceived as a fun challenge, leading to unpredictable but not necessarily undesired effects. Similarly, it is not possible to foresee how the flowers will appear in Autonomous wallpaper, unless the exact same picture has been used before. This lack of control is, however, considered as an important part of the system.

Interestingly, the lack of control conflicts with classic ideals of direct manipulation and points to the value of moments of surprise, which is not

seen as an interaction ideal in more traditional usability-oriented paradigms of HCI.

4.5 Open for social interaction

Social interaction around photographs in HCI has often involved viewing or organising photos together, for example in a desktop application, which usually implies that one person is controlling and structuring while other people are more passively observing. Playful photography can support an alternative and preferably more engaging form of social interaction.

It is apparent that Squeeze supports and builds upon social interaction and shared experiences of photography. In fact, the design requires more than one person to take full advantage of its functionality through the physical distribution of the controls on the sack-chair. This is in line with the emphasis on co-experience as promoted by Forlizzi and Battarbee (2004) who suggest that experiences can be enhanced through sharing. Thus, this should be considered as an important issue for playful photography.

Context photography and Autonomous wallpaper do not require several people to interact with each other, but allow for various social experiences nonetheless. In fact, it can be argued that both designs could be meaningful as a shared activity. Context photography was inspired by lomographers, who share a very specific practice, interest and community. In a similar way, Context photography could lead to emerging groups of people who enjoy this particular way of taking pictures and want to share their experiences with others. In the case of Autonomous wallpaper, it could become a conversation piece as well as a collaborately created "garden" of flowers at, for instance, a social event.

4.6 The purpose of taking pictures changes

Playful photography provides new opportunities for *why* pictures are taken. Early purposes of amateur photography were to memorialise a vacation, and more recent purposes of using camera phones include taking a picture to memorise a receipt or send someone a visual reminder. With new technology, the reasons why people take pictures might change. One important part of playful photography is that this "why" also is likely to be open for interpretation (Sengers and Gaver 2006). This means that the goal of taking pictures and how to enjoy them is ambiguous and something that users actively engage in. For example, using Squeeze together with others to explore the sack-chair and look at pictures on the wall potentially allows for a more engaging experience of the resulting pictures that is affected by the presence of several people. Context photography changes the overall experience in the moment of taking pictures, as sound and movement usually do not affect pictures in this way. However, how such pictures are interpreted—as the "truth" of a situation or simply as a fun effect—is left open to users to decide. In a similar way, users decide for themselves how and when they use Autonomous wallpaper. Pictures that are explicitly taken to be

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sent to the wallpaper are likely to be different from pictures that are taken as a note or as a memory. For instance, a picture could be taken of a pattern or even just a colour that the user wants to see as a pattern on the wall.

5. Discussion

Above, we have unpacked playful photography based on the experiences from our design concepts, and the experiences of trial uses of these. The ambition is not to outline the defining characteristics of playful photography, but rather to suggest characteristics of a design space in this way pointing towards such and supporting designers who want to design similar applications and explore this space. Furthermore, with the characteristics we wish to invite for a debate and sharing of experiences more generally within this area beyond singular point designs. Our concepts point to the potential of moving interaction and experience around digital photography into the physical space, in fact where it came from, but with the digitisation of photography it has resided for a while on the desktop platform. With this work we wish to challenge and complement this research through pointing to other directions.

Through bringing our independently developed cases together in this way, we also wish to call for design-oriented research that further investigates motivations and purposes of photography. Through innovative playful photography design, we can make new kinds of experiences and relations to a variety of digital photography applications possible. Even though the characteristics of playful photography were derived from having theories of homo ludens, pragmatist aesthetics and experience meet the area of digital photography; the characteristics seem to point to more generic qualities of playful ways of engaging with digital materials, which go beyond digital photography. It would be relevant for future design-oriented research to investigate how the above characteristics can inform design for other domains within a playful realm. Furthermore, future playful photography research could investigate the significance of the resulting pictures, and how these are interesting to the spectator as individual or society, as exemplified in, for example, Camera Lucida (Barthes 1982). Here Barthes reflected on the role and meaning of photographs from the perspective of the 'spectator', the viewer, of a photograph. As means of reflection, Barthes defined two themes, studium and punctum, where the studium is the subject of an image or the symbolic meaning, and the punctum is what makes it interesting for a particular spectator. This could be a curious detail, or as in Barthes' case, a personal relationship with the subject in the picture together with a sense of time that triggers punctum. Barthes was interested in the relation between these two. Theoretical themes like those presented by Barthes could be valuable in guiding the further exploration of playful photography. The examples in this paper focus on novel playful ways of supporting the act of taking photographs and displaying/sharing them afterwards, but not on the visual qualities of 'playful photographs'. If looking at the visual qualities, the

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themes of studium and punctum could be relevant to consider—do they exist in the pictures resulting from playful photo applications, and how can we speak of them? What is it in a picture taken with a playful camera application that triggers the spectator (as opposed to the operator, the photographer)? Finally, as Barthes stressed in his work, looking at and appreciating pictures is something that is highly subjective. We can speak of certain qualities in pictures, but it is the spectator who ultimately decides what makes an image interesting to her. This is supporting the value of the subjective proposed by experience-centred HCI, and therefore of high relevance to playful photography.

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6. Conclusion

In this paper, we have furthered the concept of playful photography based on theories of homo ludens and experience-centred perspectives as well as the development and trial use of a number of design concepts supporting playful photography. In this way, we have described how playful photography is grounded in theoretical perspectives and we have unpacked characteristics of playful photography based on the theories and design cases. We have positioned playful photography with respect to the history of photography and we suggest that some of the qualities of early photography, e.g. of having interaction and experience around photography as integral part of the physical space has become lost with digital desktop-based photography. Our cases and trial uses suggest that ubiquitous computing open up for new opportunities for re-establishing and even improving the experiences around photography in this direction. Furthermore, we have positioned playful photography within the field of HCI and we have pointed out how playful photography can serve to complement research into, e.g. photowork (Kirk *et al.* 2006), which focuses on improving the processes between capture and sharing. Both our design concepts as well as the characteristics of playful photography we have established suggest that there is an unexplored potential in designing for new experiences around the processes of capturing and sharing digital photographs. We have established a number of characteristics of playful photography as part of our unpacking of the concept. Our goal with this unpacking is to promote the design space of playful photography and to encourage others to explore this further. Furthermore, we wish to invite for a debate around this space, i.e. what other characteristics for playful photography can be established and how can the experiences from this design-oriented research into playful photography bring about lessons for designing for playful relations to other types of digital materials.

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