A Process of Engagement: Engaging with the Process

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ABSTRACT

Photography is now a highly automated activity where people enjoy phototaking by pointing and pressing a button. While this liberates people from having to interact with the processes of photography, e.g., controlling the parameters of the camera or printing images in the darkroom, we argue that an engagement with such processes can in fact enrich people's experience of phototaking. Drawing from fieldwork with members of a film-based photography club, we found that people who engage deeply with the various processes of phototaking experienced photography richly and meaningfully. Being able to participate fully in the entire process gave them a sense of achievement over the final result. Having the opportunity to engage with the process also allowed them to learn and hone their photographic skills. Through this understanding, we can imagine future technologies that enrich experiences of photography through providing the means to interact with photographic processes in new ways.

Author Keywords

Photography, process, experience, reflective practice, craft.

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

Today, we observe a proliferation of photos being taken and shared on various sites. One reason for this is that cameras are now very accessible, almost ubiquitous. The automation of photographic technologies has also made photography an increasingly easy activity for people to participate in. People do not need to worry about the technical aspects of phototaking. The camera automatically controls focus, aperture and shutter speed, allowing people to simply enjoy taking photos through the press of a button. Finally, there is an increased opportunity for phototaking through the convergence of the 'traditional' camera with many other devices such as smartphones, notebooks, and tablets. This is perhaps why photos captured using the iPhone now outnumber the photos taken using specialized cameras on photo sharing sites like Flickr [2].

The aim of this paper is not to criticize the increasing automation and simplification of photography. In fact, we can see how automation can free people from dealing with technical challenges, allowing them to focus solely on the act of phototaking. However, we argue that in addition to automation, people should also be given the opportunity to engage with the processes hidden by automation. Drawing upon a field study conducted with a photography club by the lead author of this paper, we illustrate how providing people with an opportunity to directly control and learn about photographic processes can in fact enrich people's overall experience of photography. By uncovering and discussing the processes often usurped by automation, we show that this engagement can be experientially rich. Being able to tinker, experiment, and master skills that directly influence the process and the aesthetic outcomes of the final image is experienced as deeply satisfying and meaningful to the photographer. This can inspire how we approach the design of future technologies, especially for photography. In addition, we also believe that supporting such enriched experiences can potentially encourage casual photographers into learning more about the intricacies of photography as a craft.

RELATED WORK

HCI literature on photography reveals considerable efforts that view it as work. Explicating how to support people's efficient and effective search and/or retrieval of photos is an important endeavor especially in light of the burgeoning amount of photos that are being taken and are now residing in people's digital libraries [3]. Kirk et al [12] present an intimate view of how people manage their photos through what they term 'photowork' - the activities people perform with their digital photos after capture but prior to end use such as sharing. Miller and Edwards [19] took Kirk et al's conception of photowork as a starting point to describe activities that occur after the photowork is completed - photo sharing and organization via social media. These investigations are focused on what happens after the photos have been taken.

Grinter's [11] work with amateur photographers highlights their devotion to the work involved in producing an image. Her study focuses on the coordination of photography clubs but it also reveals how photographers strive to master their skills in order to achieve higher quality images. This push

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for quality also drives their enthusiasm to experiment with new processes and digital technologies that were emerging at the time of her study. For example, Grinter discusses how photographers adopted newly available photo editing software and how they experimented with it to improve the quality of their submissions to the club's photo competitions. Her descriptions of these photographers resonate with other scholars' descriptions of various collectives of amateurs [4] and craftspeople [21]. In fact, Sennett's [24] study of the craftsman argues that it is the aspiration for quality that drives the craftsman to improve so as to get better rather than to get by. To be a good craftsman is to be engaged with the process, developing skills to a high degree, and in general being dedicated to good work for its own sake. But how is this engagement experienced by photographers? Understanding this experience and how we can support for it during phototaking is important as HCI moves toward designing technologies that not only provide the required functionality but are also optimized to support the full range of users' experiences [17].

Some researchers have begun to focus upon engagement and experiences in the context of photography. For example, Frohlich [8] presents AudioPhotography to enrich our experience of photos by adding audio. Meanwhile Gaver et al's [9] Photostroller, a device to present slideshows of photographs, supports ludic experiences with photos that are pleasurable and engaging. Thus, researchers have come to realise the potential of photographs to be experienced through reflection and remembrance, performativity and expression, as well as connection and communication when shared with others [14]. Yet, these efforts are still primarily concerned with people's experiences when consuming photos, and not during the act of phototaking.

Ljungblad [15, 16] searches for ways to enhance the experience of phototaking. Studying amateur photographers, Ljunglbad [15] looked for qualities that can be transferred to mobile devices. These photographers desired unpredictable results, which they achieved by using slightly faulty cameras, by taking photos quickly without looking through the viewfinder, and without trying to influence their subjects. Taking the abdication of control a step further, Ljungblad [16] explored how the SenseCam—a fully automated camera—influences people's experiences of taking and consuming photos. Although total automation relieved people from worrying about when and what pictures were taken, there were situations when this was not desirable [16]. In some situations, the experience would be more fulfilling if people had the ability to take control and override this automation.

Like Grinter [11], we are interested in the production of the image, but with a focus on people's experiences rather than on the collaborative aspects of a particular community. Similar to Ljungblad [15, 16] our aim is to find ways to enhance the experience of phototaking, but unlike her, we focus upon how people might experience photography when they have a high degree of control over the process. In other words, what is this experience when people sidestep automation and have the ability to control all parts of the process from the setup of the photo shoot to the processing of the final image? To answer this question, a field study was conducted.

APPROACH

A field study was conducted with an amateur photography club in Melbourne, Australia. This club promotes traditional forms of film-based photography. The club members typically share a passion for vintage cameras, shooting on film, and activities like developing and printing film in the darkroom. They prefer to have a high degree of control over the process of photography instead of using digitally automated technologies. That is why this cohort was chosen. They are not luddites who reject digital technologies. On the contrary, all of them use various forms of social media to share their photos (digitally scanned from film). In fact, the club emerged out of a Flickr group of like-minded photographers and now constitutes a registered photography club that organizes exhibitions, competitions, and regular informal outings ('photowalks') to take photos and to socialize.

The fieldwork took place over a period of seven months and involved participant observations and interviews. The study started by observing the club's Flickr group interactions. Data gathered from these observations included topics of interest in online discussions, the types of photos that they take, and who the active club members were. However, after a month of observation, the lead author joined the group officially and began to contribute actively to the group's online activities as well as participate in their offline gatherings. The idea was to become immersed in the community and to get a sense of what they valued about photography and their experiences of phototaking. Reflective notes about how the lead author felt, his evolving perception of photography, and how his interactions with the group might have colored his observations were kept throughout the duration of the fieldwork [5].

A series of semi-structured interviews was conducted with eight club members two months into the fieldwork. The interviewees' age ranged from 18 to 40 years, and their experience with film-based photography ranged from 3 to 16 years. All interviewees regarded film-based photography as their hobby, although some of them also did commercial work. (Table 1 contains the relevant information of the interviewees. All names have been anonymized.) These interviews served to discuss their experiences with film-based photography. For the first interview people were asked to bring one of their cameras to talk about their approach to taking photos, their engagement in the technical aspects of film-based photography, and their choice of equipment. A second interview with the same

Name (anonymized)	Age	Occupation	# Years into film-based photography
Diane	40	Chef	4
Gary	18	Student	3
Henry	21	Student	3
Ken	25	Professional photographer	5
Martin	34	Technician, part-time photographer	6
Robert	37	Film reviewer, part-time photographer	4
Sebastian	37	Restaurant owner	16
Steve	39	Graphic designer	10

Table 1. Demographics of the participants.

members was carried out in the fourth month of the study. For this interview, people were asked to bring photos that reflect their interest in film-based photography. These photos were used as resources for discussion about what they value in a photo: how it is produced and their personal aspirations with photography. All interviews were transcribed for analysis.

While the lead author was responsible for all aspects of the data collection, all authors carried out the data analysis. Iterative coding of the field notes and interview transcripts were carried out in NVivo with a focus on people's experiences of the process of photography [18].

The next section describes the findings of the fieldwork, which is primarily concerned with the process of 'making' a photo and people's experiences of interacting with the medium of film: beginning with the intention to take photos, the preparation of camera and film, and ending with the scanning stage before the photos are shared. The personal anecdotes and comments from the members of the club highlight the difficulties and failures, but also the pleasure, pride, and identification with the process of photography. Quotes from interviewees are labeled to show both the person and the interview it is taken from.

THE PROCESS OF 'MAKING' A PHOTO

Choosing the Film and Camera

Before a series of photos are taken, we found that people spend a significant amount of effort and time thinking through the equipment and film that are to be used. These choices depend on the availability and access to equipment, personal preference, prior experience, as well as on the kinds of photos one wants to take.

Despite the advancement of digital photography, there are still a lot of different films available. Besides black and white or color, there are films more suited to daylight or nighttime. Personal preferences shape people's choice of film used for a particular shoot. Thus, there is a process of learning and understanding through experimentation, looking at photos on Flickr, as well as discussions with other photographers as to which particular type of film to use, or the kind that can best deliver the sort of image that one prefers or desires.

"Slide film looks different from print film, they render colors different. It's quite particular, and I don't know all the different types, but some will be nice for skin tones, others will be more suitable for blue'ish, green'ish tones. And slide film is sharper than print film for some reason. Usually, it's the lens that creates sharpness or softness, but also slide film does look sharper than print film. With the particular one that I used, the contrasts were more pronounced too, which I quite liked, more black blacks for example, and brighter brights. Pictures came out looking punchy rather than flat." Diane (I2)

Some take the preparation of film even further. For example, Gary buys his films in bulk and he uses a bulk loader to cut the film into strips for 36 exposures and roll them into standard film canisters. Gary may save some money this way, but he also enjoys the process. Despite being challenging he feels that he is personally involved in every phase of the process of photography.

"I roll my own film, load it myself, develop it myself, and print it myself, which is a significant amount of effort compared to sticking a memory card in a digital camera, both in terms of money and effort. But I' m happy to pay that extra price, because I like the aesthetic result, I like the process, and I like the results I get from it." Gary (I1)

It is important to select the right camera for the different photos that one wants to take. For example, to take photos of strangers on the street, the rangefinder cameras are smaller and thus appear less obtrusive. They are also silent and quick to set up. Like most film-based cameras, the rangefinder offers a high degree of manual control, from winding the film forward to manual focusing. The ability to physically interact with high precision mechanisms in cameras, such as the expensive and well-made Leica camera, appears to enrich some people's experience of photography.

"Once you put a roll of film in there and start snapping, you'll see why it's so different – it's just small things like winding the shutter, winding the film forward. It's that tangibility. Whereas with digital you just click. I remember, a friend and I went to a photo shop to play with Leicas. And we were just standing there – gschh [noise of clicking and winding]. We stood there for 10 minutes like 'wow!' you can feel like the quality. With digital you just press a button, and then a red light comes on, and it's writing to the card, and that's it – it's over [a not very excited expression on his face]." Henry (I2)

Manual Control and Setting Up the Shoot

A common theme arising from the interviews was that of control. Control over subjects, location, available light, and equipment. And with equipment such as a film-based camera, you have to know how the camera works because there isn't any automation provided. The club members typically preferred older cameras, which have no in-built light meter. Hence they rely on light readings from a separate light meter in order to adjust the aperture and shutter speed on their camera. Furthermore, such cameras require careful framing and typically manual focusing.

For example, Sebastian's preferred camera was a Leica rangefinder that delivered excellent results, yet in his own words it was *"painful to use"*. *"It's like a wild horse, and you need to tame it; it requires mastery, whereas a lot of Japanese cameras just do it automatically."* Similarly, Ken argued passionately *"you don't actually need a computer to get brilliant results."* He was referring to the work of Ansel Adams (a famous American landscape photographer known for his mastery of the camera and the darkroom) to argue that all you need is *"to know what you are doing."*

Despite the apparent difficulties involved to master the camera in order to produce the desirable results, these photographers persevered. In part this is because photographers they admire have undertaken the same process of learning and have continued to engage with the process in order to produce great photographs. Also, developing the ability to control the camera that appears simple and yet cumbersome adds a sense of agency to their phototaking. Mastering these skills gives them a sense of pride; supporting the assertion that agency should rest with the photographer and not the camera. In other words, a good photo is not simply a result of a great camera but that it requires a skilled photographer.

"I think anyone who has a professional looking camera and can take reasonably good photos has probably had comments like 'your camera really takes good photos!' It happens all the time, and that's really annoying, because if I had given you the camera, you wouldn't have taken the good photo. And I'm not getting any respect for the photo – I'm the one who took it!" Ken (I1)

Similar to learning to control the processes of the camera, the control over oneself to wait for photographic opportunities is another key tenet of creating a 'good' photo. The person needs to engage with the environment prior to taking the photo, requiring their senses to be sharpened, and a heightened awareness of their surroundings. That is why many photographers stress the importance of taking time to prepare the shot, to wait for a decisive moment when something significant happens, and when all the elements of the picture come together as a near-perfect composition. The ability to wait for a decisive moment is a common skill amongst most photographers and not just limited to film-based photographers. However, the equipment involved in film-based photography does slow the photographer down and in turn sensitizes them to the environment and encourages a more considered approach. Furthermore, film-based photographers are constrained in the amount of images they can take, which ranges from 36 on a roll of 35mm film to a single shot on a sheet of large format film. While this doesn't stop people from taking photos, it does make them more selective about when to shoot. Fred Conrad from the New York Times Lens blog [6] succinctly summarizes the ideal of slowness and control that the photographers in this study strive for:

"One advantage of using larger formats is that the process is slower. It takes time to set up the camera. It takes time to visualize what you want. When doing portraits, it enables the photographer to talk and listen to subjects, to observe their behavior. When I use an 8-by-10 camera for portraits, I will compose the picture and step back. Using a long cable release, I will look at the subject and wait for the moment. It's very liberating."

While the above describes how people seek control to obtain the results that they envision, the cameras they use (in this case, old cameras) also come with imperfections, flaws, and faults. Rather than fixing or replacing such equipment, some of the club members embrace these idiosyncrasies. In fact, they talk about the thrill of overcoming these challenges through improvising and finding unpredictable results which makes the experience of film-based photography interesting and unique to them.

Embracing Idiosyncrasies and Experimenting

Old cameras are often not lightproof, which creates unpredictable effects upon the final image. While photographers who strive for perfection would try to avoid light leaks at all cost, the club members embrace these flaws because they can add a unique element to a photo. One flaw is lens flare, which has become so popular that many digital photographers add it during postproduction using the Photoshop software. However, from the perspective of those we interviewed, the digitally added lens flare cannot compensate for the unpredictable lens flare created by using old lenses.

"What I like about this lens is the way that it handles light. Sometimes light seems to creep around, like flares. And it looks quite beautiful with this lens. It's quite beautiful to look at." Robert (I1)

Robert has also turned the faults of his medium format camera and lens into his trademark way of taking photos.

"My camera lens has a stuck aperture—so the aperture is wide open, and you can't change it. It's a common fault and I bought it with that fault. It means that you are dealing with a shallow focal point. It changed the way that I shoot moving objects. I don't chase them with the focus, because it's hard to get the focus right. You got to look at the screen and check when it is in focus."

"So what I did was to set up the focus beforehand and anticipate movement. For instance, this one [showing a photo], I did where I stood in front of them, I lined up, I focussed around 8 feet in front of me. And then I waited until they moved into focus and took it. It's a different way of shooting. There is no autofocus – with an autofocus camera you chase the object, but I'm anticipating the object." Robert (I1)

The idiosyncrasy of Robert's faulty lens has taught him to anticipate action and to wait for the right moment to take a photo. Another fault is that this lens is very sensitive to light, which means that this lens is more suitable for phototaking under low-light conditions. This realization led Robert to embrace this particular idiosyncrasy. In fact he is now well known on Flickr for his street shots at night with bright and blurred backgrounds.

Being familiar with one's camera, the film medium, how light behaves, and how to control the camera, means that people (if they so choose) can find opportunities to experiment. Wanting to take the idea of the pinhole camera further, Martin experimented with how novel images can be created through the playful use of ice and light in photography. Martin tried to freeze film in a block of ice before exposing it to light. He persevered and tinkered with the process, refining it and trialing it before getting results.

"And then the next day I took that block of ice, which was by now a cylinder of film inside a block of ice, and I put that into a cardboard box. And the cardboard box I sealed up, and then I put pinholes on all the sides. And I put it outside for about 15 minutes. It turned out really good, to everybody's surprise." Martin (I1)

Finally, film-based photography generally means that the photographer has to wait until the film gets developed to see how a shot turns out. This may seem like another idiosyncrasy in the age of digital photography, but the photographers in this study generally regarded it as a positive thing. Waiting and anticipating can heighten the photographic experience. The instant feedback afforded by most digital cameras can take away the experience of excitement and anticipation of how the image will turn out, or not.

"I hate it! It's so damn obvious, digital. You take a picture and you quickly check to see it. Even when you turn the screen off, you still have the itch to see it." Sebastian (I1)

Film Development

A unique aspect of film-based photography is the need for film development. While film can be developed profesionally at a photo lab, being able to do it yourself adds to the experience of photography. It is satisfying knowing that you have been personally involved in the process from film selection to its development.

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Rolleicord V. Shanghai GP3 pan 100, developed in Rodinal 1+100 @20C for 60 minutes (agitate first minute, then stand).

Figure 1. Screenshot from Ken's photostream on Flickr. Ken shares information about the process in the image caption.

"I find it part of the enjoyment of the whole photographic experience. I really like developing the film myself. And you know you can pull it out and see the images come out and it's a feeling of satisfaction that I've done the photo from start to finish." Ken (I1)

Having to develop the film allows for further experimentation with the process and the final outcome of the photo. The more experienced home-developers in our study experimented with techniques like 'pushing' and 'pulling' the film in order to add or decrease the contrast of images. This gives black-and-white photos a unique look. The club members share their processes and their experiences at their outings, meetings, and via discussions and comments on Flickr. For example, Ken adds his choice of equipment as well as the process description to the metadata of his Flickr images, which in turn creates opportunities for discussion and support cooperative learning (see figure 1).

Some also work with experimental techniques to defamiliarise [25] or even destroy the image. For example, Diane puts salt solution on her film to partly destroy the surface. She said that she got *"chaotic and spotty results",* and as with the overall process of film-based photography, *"it's just fun to see what comes out."*

While Diane purposefully manipulates her negatives, others embrace the accidents they make during the process as something that adds value to their images. Similar to the idiosyncrasies of old cameras and lenses, accidents in the development process can lead to surprising results that are difficult to mimic. For example, one of Robert's favorite images is the result of such a creative accident that added something special to an otherwise ordinary photo.

"There was still developer on the film, and it kind of ran off and stained the film. I could refix it and get rid of it, but I

actually like it because it is almost a missing sun. Like there are the guys sunbaking, there are birds, and this is almost like a sun. I actually really like it. It makes the image something entirely different." Robert (I2)

A particularly pleasurable activity when developing film is the physicality of the process and the involvement of different senses. The pictures on the exposed film are fragile and need to be handled with care in the changing bag. The chemicals are sharp and toxic, and they need to be used with care to avoid irritations of the skin or the eyes. At the end of the process you pull the film out of the development tank and see the water run off the image.

The Magic of Printing

The process of printing is perhaps seen to be the magical aspect of film-based photography. People find the experience magical not only because it is carried out within the confines of a darkroom but also because the image literally emerges onto a white sheet of photographic paper.

"Nothing beats processing the film, placing it on the enlarger and watching the print develop from thin air. I still remember my first roll of Ilford Delta 100—it was like magic!" Steve (I1)

Adding to the magic is the ability for people to work with their hands, using chemicals and to experiment with different treatments, different papers, different chemicals, duration, and color filters. Through tinkering with these variables, people refine their prints step by step. Over time they learn ways to further refine the image, whether through selectively adding light to enhance contrast, or by treating the photographic paper with additional chemicals to add a slightly different tone and feel to the image. Being able to produce different prints from one negative, making incremental improvements, and holding the printed image in one's hands, all adds to the thrill and magic in working in the darkroom (see figure 2).

"I think when I get a good photo out of this, I feel that it's better. And that's subjective. I prefer how film looks, particularly for black and white, but also in many occasions for colour. It's just how it looks to me, and how I like the result." Gary (I1)

Printing of images does take more time and is a more unpredictable process when compared to digital photographs where this stage can be supported by image editing software such as Photoshop. However, for Gary, this process offers him an ability to express his sense of aesthetics and artistic expression, and who he is as a person.

"I like the process because it has a particular aesthetic that matches what I want my art to say. It allows me to present my work the way I want to. I can present it as big prints on a specific paper, which I could do with digital, but the process is different. I don't feel as involved with digital." Gary (I1)

Figure 2. Different prints from a single negative to experiment with tone and contrast.

Actually, only few photographers in this photography club produce their own prints in the darkroom, which possibly adds to its special status. For most of the people we interviewed, the film-based process ends with the development of the film or already after shooting. While they know the basic principles of film development and printing, they turn to professional photo shops to deliver high quality negatives and prints. Instead of printing, they seek to master earlier parts of the process. As we will describe next, all photographers interviewed in this study continued the process digitally by scanning the film.

Scanning and Digital Post-processing

Thus far, the processes we have described have provided people with the opportunities to experiment and to experience a sense of achievement. However, the processes related to digital images—scanning and post-processing—was regarded as rather unexciting and sometimes even tedious. Nevertheless, digitization allows them to share images online via the club's Flickr group, to create digital prints for exhibitions, or simply to have the photo quickly accessible on their computers for any further activity.

Steve talks about the rather tedious nature of scanning. Steve scans all his photos with the highest possible resolution so that he can potentially produce large prints from the digital copy. It takes him a long time to scan and to use Photoshop to remove dust particles that appear on the digital scans.

"One photo takes about 45 minutes. It takes a long time. (...) Every year the pile [of photos] just gets bigger and bigger. When I get a free moment I scan one photo. There are lots of little spots here and there and I try to remove them. It's a lot of pain." Steve (I1)

Although this dust removal process can be automated, none of the people interviewed use this feature because it blurs the image slightly and thus diminishes the quality of the image. Various image-editing software such as Photoshop, Picasa and Aperture are used to process scanned images.

Besides the removal of dust, it includes adjusting contrast and colors, cropping, and rotating their images. However, all interviewed insisted that post-processing must be minimal in order to remain authentic to the original process. Thus, while digital software supports countless ways of manipulating an image, people appear to restrain themselves and instead, seek to produce images that are authentic to the camera used, the film chosen and the processes applied.

DISCUSSION

Our findings show, being able to engage with the manual processes of photography can lead to satisfying and enjoyable experiences. This is despite the fact that aspects of the process can be painful, tedious, time-consuming, and expensive. In fact, the data highlights that one cannot reap the benefits and enjoyment of photography without also struggling with the process. Having to endure the tedious and painful aspects of the process adds to the overall experience, giving it personal meaning and richness. As Dewey puts it, the fullness of experience "includes what men do and suffer what they strive for, love, believe and endure." [7] Steve's account of image scanning is a vivid illustration. Steve labored over the process of removing dust, spending 30-45 minutes per photo. While admitting that this process is "a lot of pain", he also knew that this is necessary if he wants to achieve the kind of image quality/perfection that he strives for and is proud of – results that contribute to his experience of satisfaction and fulfillment.

Meanwhile, having a high degree of control over the process gives people a sense of agency. This can also enrich their experience of photography and make the results more meaningful. This affirms Ljungblad's [16] exploration of people's experiences with the SenseCam, in that there are times when people do want to wrestle with the process of photography in order to make the experience more meaningful. For example, Ken reminds us that a good photo should not be attributed to the quality of the equipment but rather to the photographer's skills in knowing when to capture an image with the camera. In fact, our data shows that being able to exert influence upon the process of photography from the beginning to the end allows people to experience great satisfaction and pride.

Gary and Steve's accounts of the darkroom show how the involvement of one's hands and the engagement of one's senses can enrich the experience of photography. They regard the use of hands as well as the use of additional senses like smell vital to the process. Manipulating materials with their hands and using physical tools leads to a slowing down of the process. Each print takes several minutes to produce and experimenting with light and chemicals to get desired results is time-consuming. Slowing down allows people to become absorbed with the process. This preference for handwork appears similar to preferences of other craftspeople that combine physical and digital elements in their process [27]. Furthermore, being able to hold the printed image in one's hands also reminds them that they have been actively involved in the process from selecting the preferred film at the start of the process, to bringing the image to life on the photo paper. Holding the printed image in one's hands and being able to see the fruits of one's labor as a series of prints lined up next to one another can imbue the experience with a sense of pride and fulfillment.

In our study, people had to learn how the camera works, an understanding of how light affects the final image, how film responds to chemicals in the darkroom, and the ability to discern opportunities for interesting compositions in one's surroundings. From our data, Sebastian admits to having to learn "to tame" and to master his camera in order to deliver the excellent results he hopes for. For Diane, there is a process of knowing and learning about the particular type of film to use to get a particular type of visual result. In other words, engaging with the process allows for a gradual mastery of skills. Sennett [24] estimates that thousands of hours of practice are required to master such skills so that these activities become automatic and intuitive. While this might appear overwhelming, people don't need to master all of these skills at once. For example, some of the club members have their images developed and printed at commercial photo labs so that they can focus on developing their skills in other parts of the process, like camera control and composition.

Opportunities for experimenting with processes go hand-in-hand with learning. This provides another pathway towards the mastery of skills. We see this with Martin's experimentation with ice and film. He was able to draw upon his understanding of how film responds to light and chemicals in order to play with new modes of phototaking. Despite initial failures, he persevered with tinkering with the process to eventually produce images that delighted him and which he was proud to share with other club members.

The experimentations we depict may appear to be a solitary act, but our findings show these experimentations comes from discussions and sharing of images with others. While not the main focus of this paper, the photography club can be viewed as a community of practice [13] where people share knowledge about their experimentation, and hold shared values about photography. For example, figure 1 showed how Ken used the metadata on Flickr to share information about how he developed the film. Sharing knowledge may assist other Flickr users to learn more about the process, and it can also be a trigger that sparks experimentation in others.

Learning also takes place as people tinker, make mistakes, and discover new expressions incrementally. Most importantly, learning occurs when we are able to reflect on them. Our findings support Sontag's [26] observation that some photographers deliberately choose old and faulty equipment to get more interesting results and to leave room

for creative accidents. However, the case of Robert also illustrates a reflective practice that goes beyond merely seeking creative accidents. When Robert realized that his camera had a faulty lens, he was able to reflect upon his understanding of the process and his camera to change how he approaches his phototaking. This also included a rethinking of the kinds of photos he could take, thus, turning a fault to an advantage. Robert's detailed description of how he re-approached phototaking is an example of the reflective practice that Schön [23] talks about. "In reflection-in-action, doing and thinking are complementary. Doing extends thinking in the tests, moves, and experimental action, and reflection feeds on doing and its results. Each feeds the other, and each sets boundaries for the other." [23]. The different 'tests and moves' Ken took to develop film by using different chemicals and different developing time, and Diane's experiments with salt solution are further examples of how engaging with the process can facilitate learning through reflection-in-action. In addition, experimentation, reflection, and discussing it with others within the community may lead to a better appreciation of the skills of professional photographers and allow the individual to gain a better understanding of the craft of photography.

CONTRIBUTIONS

We contribute to HCI in various ways. To begin, we contribute to various efforts of photography in HCI.

Our study extends current photowork studies in HCI [11, 12, 19]. To begin, our work adds to currently documented accounts of 'work' that occurs within the practice of photography. This is important given the increasing diversity (and continued evolution) of photography practices. By accruing accounts of different photographic practices, we can also better interrogate and compare people's practices and experiences with various kinds of photography. Through this, we might be able to explicate interesting insights about photography and even yield new approaches to designing technologies for future photography.

Our study further implicates the need to extend the current boundaries and conceptualization of *photowork*. Proposed originally by Kirk et al. [12], photowork includes the activities that *begin* after the capture of the digital image and *end* prior to sharing. We argue that this may be too narrow. The detailed activities described in our particular variant of film-based photography reveal that a significant amount of work actually occurs *prior* to photowork (phototaking). Miller and Edwards [19] also described some photographic activities before and beyond the current boundaries of photowork. To extend our current conception of photowork to embrace these photographic activities enables a more holistic view of the range of work involved in (currently diverse forms) photography. More importantly, it adds to photowork's analytic strength. By embracing the entire range of activities in photography, future HCI research can produce a more nuanced understanding of our practices and experiences of photography.

Like Grinter [11], our work explores the processes of taking and making an image. Our work sees this from the perspective of the individual's experience rather than from the perspective of how the club coordinates its activities. To an extent, how our participants displayed shared values about photography and how they evaluated good photography skills was similar to what Grinter found. But unlike Grinter's cohort [11], it was not so much the level of a person's skills that was prized by our participants, but whether or not the person invested time and effort to develop skills for a seemingly obsolete task such as shooting with film, developing and printing.

Similar to Ljungblad [15, 16] we sought to understand people's experiences with taking photos. In contrast to Ljungblad, however, our contribution highlights what a photographer may gain when the agency rests more with the person and her skills rather than solely with the technology. Thus, while our findings affirm the potential for great photos via creative accidents from camera imperfectness, just like Ljungblad's [15], our study also reveals the advantages of careful planning to achieve desirable photos - from planning the image prior to shooting right to printing the image in the darkroom. In a different study, Ljungblad [16] showed how a fully automated camera like the SenseCam could liberate people from having to control the camera. In contrast, our findings show that having a high degree of control of the camera and other parts of the process can enrich the experience of photography, empower people, and imbue them with a sense of achievement and pride.

Secondly, we provide a rich characterization of the user-experience of film-based photography. The experiential accounts highlight how enriched and personally meaningful experiences can also arise through a combination of surrendering to challenges, dealing with ambiguities, enduring unpleasant activities as well as learning and reflecting about one's practice. This adds to more nuanced understanding of experience design. It highlights the potential role for struggle, challenge, ambiguity, and experimentation to be harnessed strategically, especially within the interaction processes to engender deeply satisfying and personally rewarding experiences. Further explorations of these elements could contribute fruitfully to the current user-experience agenda, diversifying approaches that can support the whole range of human experience beyond simply stimulating fun and enjoyment [17, 20].

The experiences of the amateur photographers resonate strongly with individuals involved with various craft movements. Besides engaging with the process as an end to itself [24] our cohort sees their relationship with technology as tools to create personally meaningful things [21]. They enjoy working with their hands and to utilize other senses

like sounds and smells [27]. They place great emphasis on authenticity in terms of the practice, materials and aesthetics of the final product [22]. As with other craft activities, the engagement of our cohort strongly resembles a work-like practice, yet they are able to choose freely the type of activities they become engaged in [10]. Thus, this study contributes to a rich account of photography as a craft.

Bogdan and Bowers [4] warn that one should not attempt to eliminate contingencies in design in pursuit of the perfect technology, but rather maintain a level of challenge that is valued by amateurs. While we agree with their emphasis on challenges, we are not arguing for the preservation of existing challenges but instead advocate design explorations of how novel technologies can incorporate interactions with processes in ways that can enrich people's experiences. We can imagine designs that through the ability to tinker with the process, engage people, allow them to learn, and a chance to grow as they reflect about their learning.

Of course, having to engage and to struggle with the process is not for everybody. Even a person who enjoys manual control of the camera may at times prefer to be able to just press a button and let the camera do the rest of the work. So what can we do with such an understanding?

Inspirations for the Future of Photography

We see that this understanding maps best to inspire new modes of engagement with photography. However, we do not believe that the way forward is to replicate film-based technology onto the digital. In fact, some digital cameras today already provide users with the option to engage with the process to a certain extent although differently to film-based cameras. One key difference is that film-based photographers are encouraged to be more reflective about how their actions influence the outcome due to the lack of an immediate image preview and the costs (and risks) associated with every step of the process. A further difference is the greater involvement of hands and other senses in the film-based process. As pointed out by Treadaway [27], such involvement typically slows down the process and creates a different kind of thinking space. Also, we are not suggesting the obliteration of automation in photography but rather that people should be given the freedom to move seamlessly between point-and-shoot mode and being able to manually interact with the processes of phototaking. Moreover, we should draw upon the affordances of technology to envision a (near) future whereby people, if they so choose, can engage creatively with the processes of photography.

With the convergence of cameras with smartphones and other computers, one prominent affordance we can imagine for future photography is the potential for connectivity. One can imagine a camera that connects the user with others in different communities to learn or to get advice about photography. While current smartphone apps already provide such connectivity for sharing images after phototaking, we envision that some users may also benefit from connectivity prior and during the act of phototaking. In this case, the app may provide inspiration from famous professional photographers from the past, or suggest novel photographic challenges. Through this, users can be cajoled to engage with the process of photography and maybe even learn more about the craft.

A second affordance of digital technology is to be able to play with the order of the process. For example, the recently produced *Lytro light-field camera* [1] is a novel device that allows users to reverse the traditional process of phototaking. With this camera the user can complete the image *after* taking the picture by deciding (post capture) where and what to focus within the picture. In fact, the subversion of this process allows the person to develop multiple pictures of the same image but from different perspectives.

CONCLUSION

This paper describes and argues how the experience of photography can be enriched and made more meaningful to people when they can engage fully with controlling the process. This engagement requires people to endure and overcome ambiguity, face struggle and unpleasant tasks, meet and overcome challenges, in order to master skills so as to achieve a desired outcome. Through this, people experience their engagement as bing deeply meaningful: imbued with the individual's aspiration, self-discovery, sharpening of the senses as well as exercising and developing one's artistic values.

Being able to make choices in every stage of the process—from the start to the end—seems to allow people to experience a sense of agency, a feeling of deeper involvement, and pride. This provides an opportunity to dialog with the tools and processes (as well as with oneself and fellow 'learners'). We argue that this dialog supports reflective practice, in that it leads to reflection-in-action, encouraging people's learning and opening up the potential for people to design their own experiences. For example, people can set their own challenges, targets, and modulate the pace of their own trajectory of learning.

In closing, we wish to reiterate that we are not seeking to demonize automation in photography, nor are we advocating that people should be imposed to engage manually with the intricate processes of photography. What we have found through studying people's participation in film-based photography is that for some, having the opportunity to be able to directly control and manipulate various processes of photography can have outcomes that are relevant to the DIS community. Firstly, it provides a more nuanced understanding of how we experience our interactions with tools and processes. Secondly, it highlights how such engagement can lead to deeply satisfying and meaningful experiences. Thirdly, it

demonstrates how agency, and the freedom to experiment during our interactions with technology can potentially bring a sense of wholeness to our activities, potentially imbuing it with meaning and value [17].

But to do so, we need to be clearer about what processes that we want to make available (or automate). After all, even in film-based photography, there are certain degrees of automation (e.g., the press of button to release the shutter). Furthermore, we must take into account the domains, situations, and contexts of use. As such, this paper opens up a dialog that calls for further and deeper research. Through this, we hope that our designs of future technologies will not only be easy to use but at the same time provide opportunities for people to engage actively with all their senses, to develop a greater appreciation of their activities, and also to experience technology as empowering, supportive of their goals and what they value.

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REFERENCES

1. Lytro Light Field Camera. http://www.lytro.com/
2. Most Popular Cameras in the Flickr Community. http://www.flickr.com/cameras/
3. Ames, M. and Naaman, M. Why we tag: Motivations for annotation in mobile and online media. Proc. CHI 2007, ACM Press (2007), 971-980.
4. Bogdan, C. and Bowers, J. Tuning in: Challenging design for communities through a field study of radio amateurs. Proc. C&T 2007, Springer (2007), 439-461.
5. Coffey, A. The ethnographic self: Fieldwork and the representation of identity. Sage, London, 1999.
6. Conrad, F. R. Slow photography in an instantaneous age. http://lens.blogs.nytimes.com/2009/05/17/essay-slow-photography-in-an-instantaneous-age/
7. Dewey, J. Experience and nature. Open Court, New York, 1929.
8. Frohlich, D. Audiophotography: Bringing photos to life with sounds. Kluwer, Dordrecht, 2004.
9. Gaver, W., Boucher, A., Bowers, J., Blythe, M., Jarvis, N., Cameron, D., Kerridge, T., Wilkie, A., Phillips, R. and Wright, P. The photostroller: Supporting diverse care home residents in engaging with the world. Proc. CHI 2011, ACM Press (2011), 1757-1766.
10. Gelber, S. M. Hobbies: Leisure and the culture of work in America. Columbia University Press, New York, 1999.
11. Grinter, R. E. Words about images: Coordinating community in amateur photography. Computer Supported Cooperative Work, 14, 2 (2005), 161-188.
12. Kirk, D., Sellen, A., Rother, C. and Wood, K. Understanding photowork. Proc. CHI 2006, ACM Press (2006), 761-770.
13. Lave, J., & Wenger, E. Situated learning: Legitimate peripheral participation. Cambridge University Press, Cambridge, UK, 1991.
14. Lindley, S. E., Durrant, A., Kirk, D. and Taylor, A. S. Collocated social practices surrounding photos. International Journal of Human-Computer Studies, 67, 12 (2009), 995-1004.
15. Ljungblad, S. Designing for new photographic experiences: How the lomographic practice informed context photography. Proc. DPPI 2007, ACM Press (2007), 357-374.
16. Ljungblad, S. Passive photography from a creative perspective: "If I would just shoot the same thing for seven days, it's like... What's the point?". Proc. CHI 2009, ACM Press (2009), 829-838.
17. McCarthy, J. and Wright, P. Technology as experience. MIT Press, Cambridge, MA, 2004.
18. Miles, M. B. and Huberman, A. M. Qualitative data analysis: An expanded sourcebook. Sage, Thousand Oaks, CA, 1994.
19. Miller, A. D. and Edwards, W. K. Give and take: A study of consumer photo-sharing culture and practice. Proc. CHI 2007, ACM Press (2007), 347-356.
20. Petersen, M. G., Iversen, O. S., Krogh, P. G. and Ludvigsen, M. Aesthetic Interaction: A pragmatist's aesthetics of interactive systems. Proc. DIS 2004, ACM Press (2004), 269-276.
21. Rosner, D. K. and Ryokai, K. Reflections on craft: Probing the creative process of everyday knitters. Proc. C&C 2009, ACM Press (2009), 195-204.
22. Rosner, D. K., & Taylor, A. S. Antiquarian answers: Book restoration as a resource for design. Proc. CHI 2011, ACM Press (2011), 2665-2668.
23. Schön, D. A. The reflective practitioner. Basic books, New York, 1983.
24. Sennett, R. The craftsman. Yale University Press, London, 2008.
25. Shklovsky, V. Art as technique. In R. C. Davis (Ed.), Contemporary literary criticism: Modernism through poststructuralism. Longman, White Plains, NY, 1917.
26. Sontag, S. On photography. Penguin, New York, 1979.
27. Treadaway, C. P. Hand e-craft: An investigation into hand use in digital creative practice. Proc. C&C 2009, ACM Press (2009), 185-194.