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Mapping Interactive Experience Over Time

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Abstract: This paper presents a method to explore user experiences over time. The authors propose a structured procedure, using timelines and annotations to facilitate storytelling and data analysis in a user study. It captures participants' storytelling of prolonged interactive experience. Through our research trial, we demonstrate the potentials to use the timeline's visual representation for analytical purposes as well as creating accumulative knowledge. The novel contribution of this proposal is a complementary research method to many well-established longitudinal research approaches. The timeline annotations feature like a map on collecting information about people's prior interactive experience with technologies. It also supports a holistic understanding of a target user group and their overall user experience with devices, functionalities, and services.

Keywords: user experience over time; mapping

1. Introduction

We all have prolonged engagement with various interactive devices and technologies. User experience over time might start from early products and services, assembled throughout similar product use and built upon related genres of the interactive experience. To study a changing user experience, the understanding of the product histories or users' possessed products (Odom et al. 2009; Odom, Blevis, and Stolterman 2008; Petroski 1992, 1994) might be a good starting point. More commonly, HCI investigates user experience **directly from the users**. With approaches such as interview or focus group, researchers ask our informants to tell their **stories of uses**. The retrospection can start right after a given lab task in a usability study, or a recall of the situated use episodes that happened hours, days, months or even years ago.

Some difficulties do exist such as how to reconstruct a prior scenario from a distant, fragmented memory. However, the storytelling might help research participants recall and reflect upon individual prior use. We believe storytelling might be an ideal resource

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in longitudinal user experience research. Design practice also collect and map stories (Patton and Economy 2014), which help envisioning future viable interactive products. The understanding of storytelling and its relationship to the changing user experience becomes a primary goal in our research. This paper aims at addressing those concerns:

- Can HCI retrospective studies address both historical and individual aspects of long-term experience?
- Can participants communicate, build a common ground (Clark and Brennan 1991) and achieve a holistic understanding of their user experience over time through storytelling?

This paper describes the development of our research method proposal. Stemmed from literature such as group storytelling (Kankainen et al. 2012), product history, and changes of user experience over time, we suggested using a critical analysis of user experience over time and convert it into a structured procedure in retrospective user research.

This paper also takes Digital Photography as a topic of research. For instance, some young users might take photos exclusively with their mobile devices, while other experienced users have taken pictures for years with both traditional film and digital cameras. Their preference for photography, such as how they shoot, archive and share photos with printed or digital copies, might be dramatically different. Recently, the software and hardware innovations have converted digital camera products into the embedded camera modules in everyday mobile devices, with enormous computing capabilities through mobile applications and cloud services. As a result, users now adopted to the new “computational photography (Davidson 2014).” Their intention of use, their expectation of function, and most importantly, the interactive experience is also changed accordingly. Digital photography can be one of the good examples of user experience over time. We review those camera products and software applications existed or used by users, for the purpose of historical and individual aspects of long-term experience.

It is important to address here that we pay special attention to **enrich longitudinal research methods in HCI**. We aimed at reflection and iteration for future method implement. On the other hand, the understanding of a carefully chosen interactive experience over time, through explorations in multiple retrospective studies, might also be a prominent research direction that is not in the current research scope.

This paper structures as follows. First, we reviewed retrospective research methods in HCI and research arguments for user experience over time. Second, we apply the timeline annotations originally introduced in a research paper as structured approaches in our retrospective workshop. Third, we describe the results and map the data in an enhanced visualization. The paper concludes with the reflection and our suggestion for future method iterations.

2. Retrospective research methods for user experience over time

HCI user studies had applied structured procedures analyzing users' response, such as diary (Czerwinski, Horvitz, and Wilhite 2004; Rieman 1993) experience sampling method (Hektner, Schmidt, and Csikszentmihalyi 2006) and talk aloud in protocol analysis (Ericsson and Simon 1984). However, using those methods in the middle of interactive use might lead to an interrupted experience. For example, asking the research participants to think-aloud their current use, prompting research participants to record ongoing experience, or keeping a daily diary might break the flow of interactive use (Nakamura and Csikszentmihalyi 2002). Besides, participants might change their behavior because the expected interaction happens in an unfamiliar context, such as user studies in a lab setting (the Hawthorne effect (Adair 1984).) As a result, an after retrospection for earlier use might be a preferred method, comparing to an immediate report in the middle of interaction (van Gog et al. 2005). Interview and focus group methods are applicable approaches collecting data from our informants after defined research task.

Cues for memory, such as the system log of software uses, can serve as hints in user's retrospection. For example, Russell and Oren developed Retrospective Cued Recall (RCR): a passively capturing of the computer desktop screen when users interact with the web browser (D.M. Russell and Oren 2009). The screenshots became the references in a delayed review, regarding the search engine user behaviors happened several weeks ago. One important goal using this method was enabling users to "tell their own story" and "understand *how* participants **thought** about and framed questions as they went through their research process over **hours, days and week** [emphasis added] (Daniel M. Russell and Chi 2014, 379)." The reason to use memory cues was "the accuracy of uncued memory rapidly deteriorates after one day, there is good reason to wonder about the accuracy of retrospective recall (Daniel M. Russell and Chi 2014, 376)." With their method, Russell and Oren suggested that user research could still collect accurate data of use even in a delayed retrospection.

In short, with suitable memory aids a delayed retrospection might be still helpful for collecting data of prior interactive experience. In the following paragraphs, we build on this viewpoint and challenge if the **retrospection timespan** is more than just days and weeks, and if the **cues of use** are not readily available for later user retrospection.

2.1 Recalling a Very Long-Term Interactive Experience

Regarding different temporal scales in retrospection, Russell and Chi categorized retrospective user research, with their definition, into *Short-term*, *Intermediate-term*, and *Very Long-term* studies. The research tasks can range from two hours to two days, and users' retrospection might start right after the research task or after one or two days (Daniel M. Russell and Chi 2014, 384). The reason for Russell and Chi to define those time spans was "retrospective memories (and the reflections elicited) vary so much by the amount of time from the original event...." In addition, they also suggest to "*avoid values statement*" or

“avoid asking for global affective response from experience in the past,” which based on the argument of global hedonic experience discussed in (Schwarz et al. 2009). Russell and Chi suggested *“emotional perception from the past cannot help but be influenced by subsequent events and especially the perception of the entire experience at the end [emphasis added]* (Daniel M. Russell and Chi 2014, 389).”

We reflect and raise the following concerns. Can HCI retrospective studies still in a systematic way study a long-term interactive experience happened in months, years, or even from *the beginning of using interactive products or services (i.e. an **overall experience**)*? When a distant memory of prior interactive use is not accurate enough and mixed with others influencing factors are *told stories of previous interactive use* still valuable to HCI research?

We then briefly review the development of methods and theory toward a very long-term user experience. Peer tutoring (Höysniemi, Hämäläinen, and Turkki 2003) is a useful research tool revealing how users have learned and adopted their products use over time. Ask our informants to “teach me back” (Phillips et al. 2013) showcases their current uses and preference. Regarding a remembered experience from the purchase of an interactive product, Karapanos et al. proposed iScale, a survey tool that elicits both experience narrative and trend of use in a visual form (Karapanos et al. 2010). Some standard templet is also defined to keep track or reflect prior use, such as sketching UX curve (Kujala et al. 2011). Huang and Stolterman reviewed similar retrospective methods for long-term user experience, and many of those were structured procedures with visual aids such as (Huang and Stolterman 2013). Karapanos et al. proposed a framework of user experience based on mobile phone adoption (Karapanos et al. 2009). They defined the temporality of interactive experience with three stages, i.e. Orientation, Incorporation, and Identification. Even with this concise review, we saw many prior research initiatives and are confident that HCI might still be able to study a very long-term interactive experience with the aid of enhanced research methods.

2.2 Memory Cues for Distant Interactive Uses

Russell and Chi also suggested that proper memory cues can bring users’ back to a recognizable prior context (Daniel M. Russell and Chi 2014). Besides the passive screen captures in their developed RCR method, contemporary information technologies such as mobile devices or web browsers can automatically record system activities. Many HCI research investigate user experiences based on system logs. The massive amount of activities data also helps to infer the user behaviours in various industrial software implications. However, system log might not be always available and, most importantly, suitable for the research purposes. Also, most of the everyday interactive products do not have automatically logging capabilities. Even when the system log is available, the researchers and the end users might encounter enormous difficulty to assess, understand, and use the data as memory cues for their prior interactive experience. We then raise another concern: when automatic system logging is not available or suitable for recalling a distant interactive experience, is it possible to find *alternative and practical memory cues* in a retrospective study?

We briefly mentioned in the introduction session, that the product histories and personal possessions could serve as references in user experience research. For example, Odam et al. interview users and find various personal possession, which trigger immediate and unique retrospection connected to user' memory and use history (Odom et al. 2009). Product reviews might provoke reflections among readers, such as the review of everyday products (Petroski 1992, 1994), the review of social construction in technology system (Bijker, Hughes, and Pinch 1989) or the essays of "Evocative Objects" (Turkle 2007). Buxton's famous chapter of his changing experience using juicers with supporting visual materials (Buxton 2005) is so vivid and fascinating. Norman and Verganti's analysis of product innovations articulated the change in video game consoles and Swiss watch industry development, which is an excellent example of analytical argument (Norman and Verganti 2013). Imagine we researchers can introduce those reviews and critiques in a group user research. Participants might resonate the interactive experience description with their own stories in prior use of the home appliances, the video game consoles, or their timepieces. We considered the academic research or critique of selected interactive products could be used as alternative memory cues in retrospective studies for similar interactive experiences. We planned to explore how to incorporate those research findings and critical argument into HCI retrospective user study.

3. Research Argument for user experience over time

Essays, critique, product reviews and publications in HCI are critical arguments and often about the changes in human-computer configurations. To better communicate their arguments, the authors described not only with text but also with other supporting materials such as pictures, engineering diagrams or design sketches. We have observed many creative uses of visual materials in various disciplines, in particular for the arguments of changes over time using diagrams, treemap or timelines. In the following paragraphs, we review selected analytical visual representation in HCI, which critically explore product history or interactive experiences. The review had led to our method proposal of using existing research and annotated timeline in a group retrospective study.

3.1 Analytical Visual Arguments

We can trace the use of visual representation to communicate concepts or archive knowledge back to the Porphyrian Tree. The tree representation "depict logical relationships, affiliations, genealogical descent, affinity, and historical relatedness between the elements portrayed on the tree" (Gontier 2011). A treemap is often used to describe changes within species, families, or a genre of artifacts, such as Darwin's diagram for the origin of species (Darwin 1859) (please see Figure 1.A.) We also reviewed selected analytical use of visual materials for argument and communication in our field. In the development of theoretical framework "trajectories" for the game and interactive performance experience, Benford et al. described the trajectories using lines and diagrams. The authors noted they "have taken inspiration from the anthropologist Tim Ingold who, in his recent history of lines, has drawn

on fields as diverse as *geography, genealogy, music, drawing, calligraphy* and weaving to argue for the benefits of thinking in terms of rather than discrete networks” [emphasis added] (Benford et al. 2009). Their diagrams compared the story time and (ST) and clock time (CT), which can be used to demonstrate the authors’ research arguments and showcase the changes in game experiences (please see figure 1.B. also (Benford n.d.).)

In Norman and Verganti’s research for incremental and radical product innovation, they analyzed the meaning and technology changes in the industry development. For instance, they described several critical moments of Swiss watch industry, such as the manufacturing of mechanical watch as jewellery, the failing to use the electronic watch as jewellery, the facing of competition from Japanese electronic watch manufactures, the changing to electronic Swatch as fashion accessories, and the moving back finally to luxury mechanical watches as status symbols. They use a table and shift of meaning and technology positioning to foreground their arguments (please see Figure 1.C. also (Norman and Verganti 2013, 87).)

Figure 1 Tree map for the origin of species (A) and other analytical visual representation in HCI and design Research (B, C and D).

In Huang and Stolterman’s analysis of how interactive artifacts changes over time, they follow the “artifact approaches” and illustrate changes in product interface, product function, and the goal of interactive use with visual annotations (Huang and Stolterman 2012, 460). For example, when Facebook opened application software interface (API) for third-party developer, the internal function has changed because of API, the user interface is changed because of the new third-party applications, and the goal of using Facebook also changes to games, information portal and other business purposes (please see Figure. 1.D also (Huang and Stolterman 2012, 460).) In addition, their research arranged multiple critical moments into a top-down timeline according to temporal order for an analytic purpose.

4. Our Proposal: conducting retrospective user study with existing research finding and its visual analysis

After the literature review, we are encouraged that visual representations do help communicate academic arguments. We then question if HCI researchers can use established academic findings and accompanied visual representations as supporting materials, memory cues, or even structured procedures in other studies for user experience, such as:

- When studying game experience, can we introduce the “Trajectory” dimension diagram by Benford et al.?
- When studying timepiece or game console interactive experience, can we demonstrate the “table of meaning and function changes” by Norman and Verganti?
- When exploring mobile photography usage, can we introduce the “timeline annotations” by Huang and Stolterman, which describes changes in internal function, external interface, and the use goals for mobile photography? How about conducting research again with the same topic, replicate the original critical analysis or process, and compare the result from another informant’s retrospection?

As a result, we plan to develop our research methods with the following steps. First, we replicated a similar group storytelling setting proposed by Kankainen et al. (Kankainen et al. 2012), where the informants told personal stories that aligned to a interaction or service journey. Second, we adapted Huang and Stolterman’s analysis (Huang and Stolterman 2012) illustrating the changes for an interactive product and use it as a reference in the group storytelling. Those two published research can be an ideal reference for exploring interactive experience over time, through describing the changes in a product or a service journey.

In particular, Huang and Stolterman’s analysis of mobile photography experience provided a timeline representation with *five critical moments*, arranged in a top-down order (Huang and Stolterman 2012). This analysis captured a rapid software and hardware innovation in mobile photography, including smartphone, GPS, and mobile photo software applications. We planned to invite out research participants responding to this analysis, asking if they agree or would add extra moments according to unique personal experiences. We also planned to extend the discussion from the current use journey to a longer history of interactive use, such as in similar digital photography products.

We anticipate, through the group storytelling, participants and researchers can discover other important moments of interaction in a long product history. Also, Huang and Stolterman’s analysis was not grounded with empirical evidence. We planned to invite our research participants to tell more their stories, which might help to validate the prior analysis for the goals of uses. In addition, we plan to observe if annotated timeline is an applicable research approach for group storytelling.

4.1 Method Trial Workshops

We recruited participants through faculties in U1 and U2 (pseudonym for anonymous peer review), email invitations, flyers and social network advertisements. Twelve graduate students and one professor joined the workshop in U1. Six graduate students, two Ph.D. students and one faculty joined the workshop in U2. All of them were current students or had prior education in design with a focus on ergonomics, interaction design and information system. After their consent, the workshop facilitators recorded the conversation and took

pictures for future anonymous analysis. The exploratory workshops had a controlled number of participants based on the typical focus group research setting. The workshop structured as follows:

INTRODUCTION

The research facilitators introduced Huang and Stolterman's timeline analysis of mobile photography to the workshop participants. The facilitator showed a printed timeline diagram and explained those five critical moments of the change in product function, interface, and use goals (20 minutes). The timeline diagram was available throughout the entire workshop.

RETROSPECTION

Participants were encouraged to add new moments to the existing timeline regarding their mobile photography experience (60 minutes). They could provide moments related to a particular model they have used, the experience of mobile photography they owned, or a historical event such as new generations of a product to the market. The facilitator also prompted the participants to:

- Discuss and arrange those moments in a proper temporal order (based on the shown initial timeline,)
- Contribute personal or known interactive use stories direct to those moments, and
- (Optional) Comment on the goals of use within those moments (designed goals or user's appropriate goals, according to (Huang and Stolterman 2012)).

The participant's conversation was transcribed and analyzed after the exploratory workshops.

4.2 The workshop results

We have observed a vigorous discussion among our participants in the workshops. They had contributed an impressive amount of storytelling, which had formed new moments in timeline analysis. In particular, many use episodes were told and built upon other participants' storytelling, which directly related to their user experience in the past. To better explain our research result, we first categorized the discussion transcription into the following two genres:

- The participants described **moments** of changes in user experience happened in the past. The moments might relate to the changes of product function, software, or interface. Participants might also report changes from related interactive products.
- The Participants described **stories** from their unique prior interactive uses.

The data from the transcription was so rich and difficult to fully discuss in this paper. In the following paragraphs, we will only present the preliminary quantitative analysis, such as the number of the told moments and stories and selected qualitative analysis of participants' storytelling.

RETROSPECTION: MOBILE PHOTOGRAPHY

We have identified a lot of moments (U1=46 and U2=25) discussed in the one-hour Retrospection session. Participants commented on the reference timeline by Huang and Stolterman and added new moments from their unique prior experience. The retrospection had converged nicely into discussion of product functions and use qualities, which were also similar between workshops in two universities. Recalled new moments had formed new timelines in the middle of retrospection; in additions, the workshop participants recalled not only their stories but also stories from friend or family, which is beyond our expectation of a user study. We also observe many turn-takings of storytelling throughout the whole retrospection session, which was a positive sign for a constructive user retrospection.

MOMENTS OF CHANGES IN MOBILE PHOTOGRAPHY

Participants recalled moments especially for the following two kinds of changes in interactive experience:

- **Changes of functions** on the mobile phone, for example the camera module, physical button or mechanism to activate photo taking, shutter sound, storage.
- **Changes of use quality** such as how to transfer or share photos, the different resolution of photos, how to retouch or edit the photos.

Many described moments belonged to the same aspect of mobile photography experience; as a result, the facilitators prompted the participants to group and arrange those moments with a temporal order. Table 1 described representative timelines formed among workshop participants based on their retrospection and discussion.

Table 1 Representative timelines and moments.

Timelines	Moments (arranged)
Camera module / function	No camera / One rear camera / Timer shutter / Flash / One rear camera with selfie mirror / Pivot camera module / One front camera and one rear camera / Camera module cost down / Better resolution camera module / Accessories for rear camera / One front camera and two rear camera module / Remote camera module
Activate photo taking	Software menu / Dedicated physical button / Slide on mechanism / Earphone button as shutter button
Shutter sound	Default shutter sound / Customizable shutter sound / Turn off shutter sound / Forced-on shutter sound
Data transfer and storage	Special data cable / Infrared / MMS / Removable memory card / Bluetooth / Smartphone data service with mobile APPs / WIFI with mobile APPs / Automatic backup to the cloud / NFC
Resolution and quality	VGA / 2 million pixels / 4 million pixels / 8 million pixels / 40 million pixels
Photo retouching	Retouch after photo shooting in mobile APPs / Retouch embedded in the shooting

4.3 Stories in mobile photography

We also identified a lot of storytelling from Retrospection. Many of the stories were told right after the discussion of moments and arranged timeline. Here we summarized selected stories from participants that were particular interesting, with identified timelines and specific moments related to their unique use episodes.

Threshold of resolution for product adaption (Resolution): several participants complained the early mobile photo's resolution was not good enough that mobile devices can replace an ordinary camera. One participant in U1 talked about his decision making to purchase a particular mobile phone model because of the resolution had enhanced:

I decided to purchase this Windows CE mobile phone because the photo resolution is two million pixels. I believe the resolution had passed the threshold of "usable photos" for my daily use, and now I could bring only this mobile phone. However, to use the photo function is extremely difficult, since I have to go through various levels of function menu. However, it has a dedicated shutter button that I liked a lot. Meanwhile, the quality of images was not satisfying enough, so I still bring my digital camera with me. (Participant in U2)

Easy to shoot a mobile photo (Dedicated button / Slide-on): one participant mentioned the reason he adopted mobile photography because it was very easy to shoot with a particular mobile phone:

I started to take a lot of mobile photo because of this particular phone K750i. When you slide the front panel, the camera module is exposed and ready to take photo. It's so handy, and taking photos became the most frequently used function of this mobile device, not making a phone call. (Participant in U2)

Unlimited wireless data (Smartphone data / WIFI): the wireless data plan for smartphone had changed the frequency of taking mobile photo for some workshop participants:

I don't clean my photos in my phone anymore. All my photos are sync to the cloud. Also, sharing photo with friends had no extra cost. Many IM software and social network APP become now the major ways I share photos with friend. (Participant in U1)

Prank other people with random mobile photo (Bluetooth): there was a discussion thread about how to transfer and share photos from mobile phone in a nutty way. Here is a vivid and interesting use story:

Many of us sat in a big auditorium for a boring lecture. We turned on the Bluetooth on our mobile phones and tried to pair with another Bluetooth device. If we find some weird Bluetooth ID, we will send the device some funny pictures. Just for fun and kill time. (Participant in U1)

Shopping for things for remote friends (Photo retouching after shooting): mobile photos can be used as handy visual information, which could be exchanged immediately. For example:

I stood in front of the shop window, taking a photo of all products with my phone, and send the photo immediately to my friend. My friend used a photo retouching software, marked

those products she wanted me to purchase, and send the picture back to me on the fly.
(Participant in U1)

5. Post Analysis: Presenting Research Finding with Timeline Map

Although we can only present selected moments and stories because of the limitation of paper format, we decided to map data from our trial workshop research in a visual representation. Figure 2 was our first attempt mapping storytelling. The map has a similar visual fashion with Huang and Stolterman's artifact center timeline annotations. Using similar visual elements, we added new annotations to the map according to informant's storytelling, formed new timelines, and try to analyze the goal of uses. The enhanced timeline visualization has the following three parts:

1. The **reference timeline** exemplifies Huang and Stolterman's original analysis of five critical moments in the history of mobile photography, anchoring their temporal positions.
2. The **timeline annotations** display new moments, stories, and timelines collected from our retrospective workshop.
3. The **extended analysis** illustrated the goal of use described by our informants in the group storytelling (using the timeline of camera module and function as an example).

The reference timeline helped us to align moments and told stories on the map. All the timelines, however, did not display with an accurate time scale. Instead, this map is used for an analytical purpose, and chronological order is the focal point. We anticipated the viewers could compare different moments and stories across the timelines and have a reference of temporal order.

Meanwhile, this map presented selected contents and was developed to fit a print media. The current visualization might not be ideal for every design or research implications, and we planned to develop other alternative formats to be used in HCI research or design practices.

Figure 2 Example of the timeline annotation and extended analysis in mobile photography.

6. Discussion

We reflect upon our current research implementation and suggest for the next method iteration.

6.1 Reflection on Our Method Implement

VALIDATION OF METHOD IMPLICATION

We recognize that our research does not intend to validate the implications immediately in the current trial method implement. The workshops were an early exploration, and those collected data was rich but limited for hasty generalization. For example, the sample size was small, and the current participants from design school might have individual-level factors such as high technology literacies that might impact the result. We plan to test the method with other user groups in the next round and use the method in a design project.

FACILITATION OF STORYTELLING

The length of told stories was often very short. An in-depth reflection from our informants upon a specific moment or use episode was somehow missing in the retrospection. One of the possible reasons was the tempo of the conversation. The turn taking went so fast that a focused discussion on particular moment or story was lacking. For future method implementation, we will be mindful that the facilitator must

In our workshop, the participants started with reflection upon an existing timeline. Our moderators encountered a new problem eliciting important stories and forming new timelines. They had tried doodling over whiteboard to capture most of the retrospection; unfortunately, it was not possible to take full annotations effectively. One major issue was that the participants recall too many moments and stories without a predefined temporal order. To arrange their retrospection into multiple timelines and annotations might need further confirmation with all the participants. It might be more complex than the single journey map in Kankainen et al.'s group storytelling.

In Kankainen et al.'s study of group storytelling, they suggest a moderator and additional creative secretary to help arranging five fictional stories into a service journey. After the initial steps, they added free personal reflection to the timeline. It would be ideal if we arrange extra moderator in future research, also use assistive tools to arrange the current annotations. Post-it or an interactive note taking software would be ideal for the group retrospection.

The initial timeline worked as a temporal reference in the retrospective workshop. However, the moderators and participants all found it difficult sometimes to decide temporal orders across different timelines, such as contrasting "Bluetooth for transfer photo" to "front camera module" across in different threads of storytelling. In future method implement, supported historical data, such as the temporal order in a family of similar products, might need to be provided to facilitate a structured retrospection.

GROUP DYNAMICS IN STORYTELLING

Some researchers consider retrospective research producing a phenomenological understanding of “lived experiences that belong to a *single person (emphasis mine)* (Giorgi 1997).” In our group user research, the ongoing conversation seemed to shape a shared phenomenological understanding among participants. For example, one participant talks about his or her previous use, and the other follows the conversation since they might share a similar experience. It is less explored if the conversations continue when there is a commonality of experience. Meanwhile, the dynamics among participants, such as turn taking, was critical but not studied. It is a challenging topic; however, a further analysis was beyond the scope of current research plan. We will introduce suitable research analysis, such as thematic or interaction sequence analysis, in the next round.

6.2 Positive Findings After Our Trial Research

We discuss the positive findings after our method trial research with the following two perspectives.

RECONSTRUCTING A REMEMBERED EXPERIENCE

In many cases, our research informants started recalling the changes in products and continued with their unique use scenarios. We believe the inclination might be due to the reference timeline since product functions and interface were the primary visual elements and served as good memory cues in the discussion with other participants and research moderators.

Russell and Chi describe several important factors of HCI studies using human memory: 1. To *reconstruct* a memory of a prior event according to a widely held, prototypical pattern of this event category rather than by accurate recall of the actual events. 2. To follow the *researcher’s lead* in answering questions about the event. 3. To *make associations* about events based on perceived similarities between the recalled event and other, similar experiences that influence memory of the event to be similar to those previous events [emphasis added] (Daniel M. Russell and Chi 2014).”

Based on Russell and Chi’s arguments, we review our method proposal. First, by using a timeline annotation the participants had **reconstructed** a collective understanding of their interactive experiences. The retrospections followed a clear **pattern**: participants discuss the changes in design things first, and they tell the story of use accordingly. Second, the research facilitators **led the retrospection** simply by prompting the participants to follow the timeline annotations, which had formed a perceived norm in the exploratory retrospective workshops. Finally, the participants have made a connection with their interactive experiences for the following two similarities. Our informant had discussed the **similar product characteristics** or **use qualities**; at the same time, they made associations with their storytelling with those **moments of change** in an interactive history. In short, the timeline has anchored (Huang and Stolterman 2014) the reconstruction.

ACCUMULATING THE KNOWLEDGE OF PROLONGED USER EXPERIENCE

Our research followed the analytical argument from Huang and Stolterman: five critical moments describing the changes in function, interface and the goal of use in mobile photography. Also, our study had collected additional storytelling from our informants, formed new timelines, arranged and annotated more moments and stories of use. Our research initiative was the first step toward responding and enriching an analytical argument from prior HCI research, such as exploring new perspectives in mobile photography experience.

We consider this method proposal can be a supplementary approach to many well-established user researches. Our method features an immediate overview of the history of use, mapping various timelines, moments and told use stories. For fellow researchers, this map is flexible to add new elements. For example, each timeline can be a new starting point in future research or design practices. We can pick a timeline, such as camera module or data transfer/storage, and use it as a new reference timeline for future a retrospective research. The findings of a replicated similar study can be merged back to the original map. We anticipate a recursive HCI research practice can incrementally build up a better understanding of user experience over time.

7. Conclusion

In this paper, we developed research methods based on prior HCI analytical studies. We adopted an existing visual analysis and used it as structured procedures in our user research. The result is encouraging: our informants contributed storytelling actively. The timeline served as a reference organizing unique storytelling with temporal orders. The timelines map also became a promising research knowledge analyzing a user experience over time. We are confident and the result from current research trial is helpful planning the next iteration research and design practices.

There is a continuing discussion of incorporating replicate research as a part of HCI research methods (Wilson et al. 2011). However, many critical, argumentative HCI research might not be easy to replicate. In this paper, we had demonstrated it might be feasible to replicate an analytical HCI research in a way transforming it into a research procedure in new studies. Our proposed method has the potential assisting comparison among similar studies: new retrospective user research can build on prior critical analysis, which resonates or contrasts to the previous research findings regarding user experience over time. We suggest our society considering more replication of concept, review, argument, and critical analysis in HCI.

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