Longitudinal First-Person HCI Research Methods

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Abstract In this chapter, we focus on longitudinal first-person research methods in HCI. First-person research involves data collection and experiences from the researcher themselves, as opposed to external users (or participants). We present three projects where longitudinal 'auto-approaches' to research and design in HCI were applied, namely one auto-ethnography and two autobiographical designs. These projects help illustrate the benefits and challenges of using these first-person research methods in longitudinal HCI and interaction design research. We conclude the chapter by reflecting on themes and lessons that resonate across the three projects (i.e., range of participation, data collection, time to reflect, concluding).

Keywords Auto-ethnography · Autobiographical design · Design research

1 Introduction

Within the fields of human–computer interaction (HCI) and interaction design, there has been a growing desire to more deeply understand the use of technology within real, everyday settings. The goal is to gain a deep and experiential understanding of the effect of technology on people, society, and everyday life. As a result, this goal has brought about methodological interrogations in the field over how one ought to study the increasing ubiquity of technology and the complex world in which it is used over long periods of time. As an addition to the array of HCI methodological tools, longitudinal first-person research methods offer a chance for researchers to not only investigate the mundane, ongoing, and ubiquitous presence of technology in everyday life, but also to acknowledge their own positionality in research and design, and to

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rely on first-hand experience as a mode of knowing. This shift in epistemological commitments has the potential of yielding rich, honest, and authentic reflections and insights about our ongoing lives with technology.

In this chapter, we refer to first-person research as research that involves data collection and experiences from the researcher themselves, as opposed to external users (or participants). While already informally part of long-standing design practices of making and testing technology, first-person design efforts and inquiries have recently become more visible through approaches such as the application of auto-ethnography [1–6] and autobiographical design [7–13].

In this chapter, we present three projects where longitudinal 'auto-approaches' to research and design in HCI were applied, namely one auto-ethnography and two auto-biographical designs. These projects will help illustrate the benefits of using these first-person research methods in longitudinal HCI and interaction design research for the rich data and fruitful insights they can bring around topics that are often difficult to access, such as long-term use of personal technology (e.g., mobile phones), use of technology in the private sphere (e.g., the home), and over distance (e.g., long-distance relationships). The projects will also illustrate the challenges that one may need to overcome if using similar approaches, along with some possible solutions. First, we present reflections on an auto-ethnography of living without a mobile phone. Second, we explore the autobiographical design of a system for capturing and replaying family moments over time. Third, we describe the autobiographical design process of converting a cargo van into a livable space. Each of these projects is written from the first-person perspective of the project's main contributor. This reflects the very personal nature of first-person research and an individual's account of the project. We conclude the chapter by reflecting on themes and lessons that resonate across the three projects.

2 Three 'Auto-approaches' to Research and Design in HCI

2.1 Auto-ethnography: Living Without a Mobile Phone

Auto-ethnography [14, 15] is a qualitative research form, an approach to research and writing that aims to describe and systematically analyze (*graphō* in Ancient Greek, 'writing') personal experience (*autós* in Ancient Greek, 'self') to understand broader cultural meanings (*éthnos* in Ancient Greek, 'nation' or 'culture') of technology. Building on traditions in anthropology, this method relies on researchers observing, noting, and reporting on personal encounters, or engagement with technology. In HCI, researchers have often aimed at adapting this approach for an HCI audience, either by adopting a fully 'scientific' prose that avoids the use of evocative first-person narratives, and/or by concluding the auto-ethnography with specific design guidelines, or a concrete set of opportunities for design. There are a few notable exceptions to this, for example Sengers's [16] reflections on IT and pace of life,

[17] use of personal fitness and self-tracking technologies to lose weight, and [5] experiences living without a mobile phone for nine years, which we discuss as a first case.

2.1.1 Before Auto-ethnography

On brink of burnout in late 2002, I (Andrés Lucero) decided it was time to get rid of the very tool that for the previous three years had allowed me to juggle four simultaneous jobs as a web designer, a university lecturer, a professional soccer referee (Fig. 1), and a freelance designer: my mobile phone. The idea of living without a mobile phone addressed a personal need of improving my life by exploring ways to reduce stress. Getting rid of my phone was neither intended as a research project [17], nor motivated by *'getting research points for it'* [13]. What started as a personal experiment, resulted in two periods of time where I voluntarily stopped using a mobile phone (i.e., 2002–2008 and 2014–2017). Conducting this auto-ethnography was the means to assess if the lack of having a phone had had any real impact in my life.

It was only in 2014, after conversations with colleagues and inspired by the likes of PSY during his honest, unassuming, and frank closing plenary at the CHI 2015

Fig. 1 Professional soccer referee, one of four simultaneous jobs I was juggling with

conference[1] that I began considering the idea of writing an auto-ethnography of my experiences living without a mobile phone. Therefore, my first step was to develop a retrospective account [18] of my life without a mobile phone during the first period (i.e., 2002–2008). These retrospective accounts (or headnotes) consisted of events, experiences, and interpretations in relation to me not having a phone that were constructed from memory [19], using projects, notebooks, photographs, and emails to aid recall [15]. I was familiar with retrospective accounts from my time assessing first- and third-year Bachelor students' self-reflections in the Netherlands. In an at-the-time novel competency-based education system, students took the role of 'junior employees' and as such were responsible for their own competency development, choosing their own learning path. My role back then was to help them plan, read, and give feedback on their competency development. Switching roles to write my own retrospective accounts allowed me to identify important themes in my daily life that helped refine this study's focus, guide the ongoing literature review, and develop a language of description for my reflections.

2.1.2   During Auto-ethnography

Once I decided to write an auto-ethnography of my experiences living without a mobile phone, I had to more systematically collect data. During the second period (i.e., 2014–2017), I collected *reflections in action* [18] consisting of biweekly handwritten and digital notes taken on a notebook or iPad, respectively. These reflections in action were complemented by emails, photographs, and tweets. In addition, whenever traveling I recorded field notes [20], which I tried to write on the spot, or as soon as possible after the event.

As I was half way through the second period of the auto-ethnography, I began an ongoing and parallel process analyzing data. After a formative analysis based on *retrospective accounts, reflections-in-action*, and *field notes*, a summative analysis [18] was conducted where an overarching process of categorization and theming [20] took place. Recurring problems, changes in attitudes, and significant concerns emerged after deeper and more detailed reflections, which developed into meaningful units [18]. These units or themes form the foundation of this auto-ethnographic narrative.

In addition, I experimented with themes by drawing tables [20] and different types of visualizations to help clarify my thinking and keep an overview, similar to the one shown in Fig. 2. I also shared my experiences, my initial interpretations, and drafts at different stages of this auto-ethnography with colleagues and extended family members [15, 20]. Doing so allowed me to gather new perspectives and offer alternative interpretations. Finally, I compared and contrasted my experience against existing research [15].

As for the main insights of this study, these were connected to four meaningful main units or themes: *social relationships, everyday work, research career*, and

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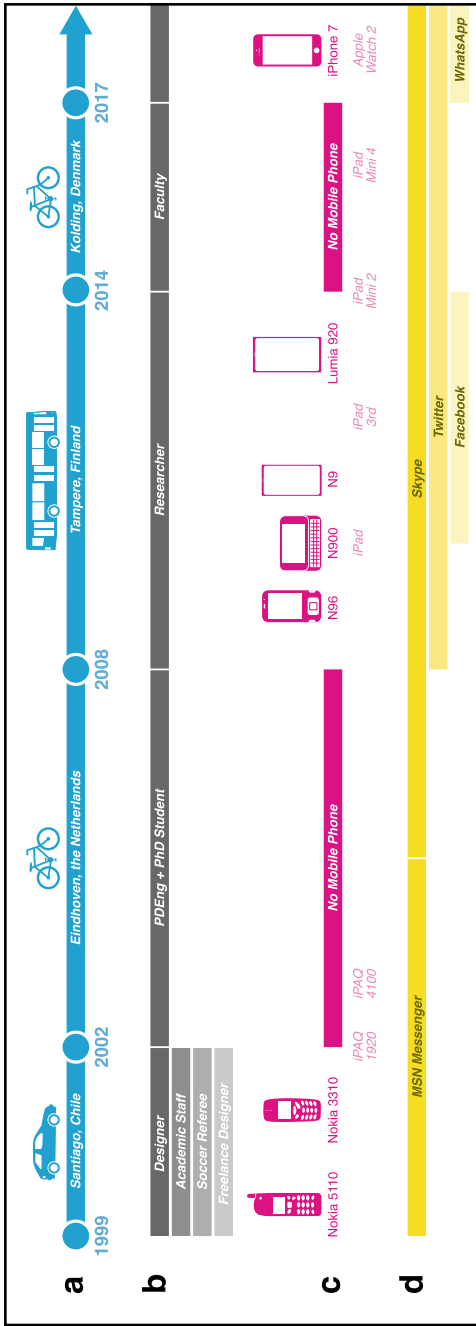[1] https://twitter.com/emax/status/591149505170382848.

Fig. 2 Example of a timeline visualization that helped me clarify my thinking and keep an overview of: **a** cities and countries where I lived and main means of transportation used (cyan), **b** main occupations (gray), **c** 'no mobile phone' periods (2002–2008 and 2014–2017) plus mobile devices used at other times (magenta), and **d** main instant messaging, video chat, and social networking services used (yellow)

location and security. In *social relationships,* I discuss the wide range of people's reactions when they first hear about my lack of phone, the assumption that some people make in terms of being able to reach and be reached by others anytime, and the factors that allow me to make the choice of not having a mobile phone. Regarding *everyday work*, I reflect on life as an academic in a Nordic country where most of my social interactions with colleagues and students happen in a collocated fashion, and where people expect and respect delays in my responses to *urgent* emails, something that would be less acceptable in cultures where it is important to be busy. *Research career* deals with occasional feelings of peer pressure to own a mobile phone, a tendency to assume that having a mobile phone is a requirement to doing research in (mobile) HCI, and the potential benefits that being an outsider to a given field of research can bring in terms of allowing one to apply frames of reference from other domains. Finally, in location and security, I describe some of the extra planning needed when traveling to conferences due to a lack of Internet connection abroad, plus the increasing trend to require a mobile phone number as a security measure. Between the start and end of this study (i.e., 2002 and 2017), many things changed in my life. Together with my partner, we moved to different countries (i.e., the Netherlands, Finland, Denmark), became parents to two children, I went from being a post-Master and PhD student to researcher and faculty member, among other things. The longitudinal perspective of this work over such extended periods of time has also made me aware of what it means to be a privileged member of a hyper-connected and technology-saturated society, and of the importance of developing empathies into the lives of people unlike me, especially when considering difficult times such as those of the ongoing COVID-19 pandemic.

I was also trying to find ways to judge my auto-ethnography, but I could only find a series of key legitimacy and representation issues of auto-ethnographic accounts as delineated by [15, 18] and [20]. Based on these issues, I have identified seven main criteria for a successful auto-ethnography [5]:

1. **Study boundaries** [18]: requires auto-ethnographers to describe the limits of their study using the four facets of time, location, project type, and point of view.
2. **Authenticity** [20]: refers to establishing a study protocol that would allow someone else to follow the researcher's procedures [18]. [15] express authenticity as *reliability*, which refers to the narrator's credibility. In addition, authenticity is manifested as *(construct) validity* when the work evokes in readers a feeling that what has been represented could be true [15], and when correct operational measures for the concepts studied have been established [18].
3. **Plausibility** [20]: relates to structuring the narrative according to the academic article genre and finding gaps in the research literature. Plausibility is also expressed as *scholarship* by [18] when the work moves beyond emotional expression to deeper levels of reflection, highlighting connections to broader themes.

4. **Criticality** [20]: entails guiding readers through imagining ways of thinking and acting differently. Criticality is also referred to as *instrumental utility* by [18] when the work helps readers anticipate future possibilities and scenarios.
5. **Self-revealing writing** [20]: consists of revealing unflattering details about the auto-ethnographer.
6. **Interlacing actual ethnographic material and confessional content** [20]: suggests that personal material be limited to relevant information in relation to the research subject.
7. **Generalizability** [15]: focuses on the readers who determine if the story speaks to them about their life or that of others they know. Generalizability is also communicated as *external validity* by [18] when, thanks to the study's strength of themes and theories, its findings might apply to others.

2.1.3 After Auto-ethnography

Since the 2018 paper was published, I again voluntarily stopped using my phone during all of 2019, thus completing a decade living without a mobile phone. In addition, two students of mine, one PhD and one MA, have since started and completed their own research projects where they used auto-ethnography [21]. While I currently have no concrete plans to write about that tenth year living without a phone, here are some reflections if you are considering engaging in auto-ethnography.

Auto-ethnography will not make your research (life) easier. If you are considering engaging in auto-ethnography as a shortcut to avoid doing extensive user research, you might end up having to spend as much if not more work when conducting, analyzing, presenting, and publishing your work. While auto-ethnography may in most cases mean you do not need to recruit or engage with participants, you will end up spending significant time and effort systematically documenting, analyzing, and reflecting on your own experiences. It takes dedication, experience, and a degree of resilience to do auto-ethnography.

Then there is the issue of getting your research accepted and published at HCI venues. Most HCI researchers have neither been trained to write rich and evocative auto-ethnographies, nor to review them. I spent two years trying to get my auto-ethnography published. I was in part unlucky with some reviewers who wrote very personal and a couple of times even hurtful reviews—remember what I said about resilience? But I also had a hard time reaching the level of depth in my reflections that would grant acceptance—and here comes experience. But do not despair. There are ways to avoid the most obvious criticism aimed at auto-ethnography. For instance, you can apply a long-term perspective to your auto-ethnography by collecting data over weeks, months, years or even a decade as I did with my experiences living without a mobile phone. Alternatively, you can have several researchers concurrently working on the same project and applying auto-ethnography to the same topic [22]. As another example of this, you can complement the one-person small data perspective by taking a big data approach running for instance a pre- or post-auto-ethnography

crowdsourced survey [21]. The big scale in data collection (i.e., in time or additional participant numbers) can help the one-person scale of the sample.

But above all, remember that the power and richness of auto-ethnography lie in that it shares voices that might not have been heard [23] and insights that might have been too subtle to elicit ([15, 18]).

2.2 Autobiographical Design: Capturing Memories of Family Life

Autobiographical design focuses on design research that draws on extensive, genuine usage by those creating or building a system. This enables designers/researchers to rapidly respond to real-life needs and frictions encountered when using the system, e.g., Desjardins' Living in a Prototype [8] and Neustaedter's Moments [11]. Through 11 interviews with established HCI researchers, [13] found that autobiographical design was a common practice in HCI; however, until recent times, it was rarely reported on. This is due to a perceived contradiction between the pervasiveness and usefulness of autobiographical design as a design practice and its incompatibility with widespread research practices. Further, [7] have discussed tensions that arise when conducting autobiographical design, such as the delicate balance between various roles including designer, researcher, observer, parent, and partner. This section describes how autobiographical design was used to explore the creation and use of a system for recording family moments.

2.2.1 Creating Moments

In 2014, as the father in a family of five with three young children (aged 1, 6, and 8 at the time), I (Carman Neustaedter) was interested in exploring ways that I might better capture my children's lives and our family as it grew together and experienced life. This could include special moments such as a child's first steps or family celebrations, as well as the more mundane stuff and the everyday moments we might share together. I could already use a camera to capture images or videos, but at times it was easy to miss important moments because I did not always know when they would occur before they happened. I also wanted to explore ways of capturing my family's life without having to be staring at a smartphone or camera screen to make sure I captured the moments 'just right.' I wanted to be part of the moments too and not just the photographer. I wanted something more automated.

For these reasons, I worked with an undergraduate student, Brendan DeBrincat, to create a system called *Moments* [24]. Moments was an always-on video recording system for families. It included a camera that was placed overlooking a space within my home along with a display to view and interact with the system. Figure 3 shows an iPad sitting on the kitchen counter. Atop the cupboard above it, a Kinect camera was

Fig. 3 A Moments display on the counter in the corner of kitchen and camera above

placed to capture video footage. The goal of Moments was to help families collect and reflect on past moments and experiences that took place in certain areas of the home. In the simplest description, the camera recorded and saved video all the time, and the iPad display allowed users to replay it (Figs. 4 and 5).
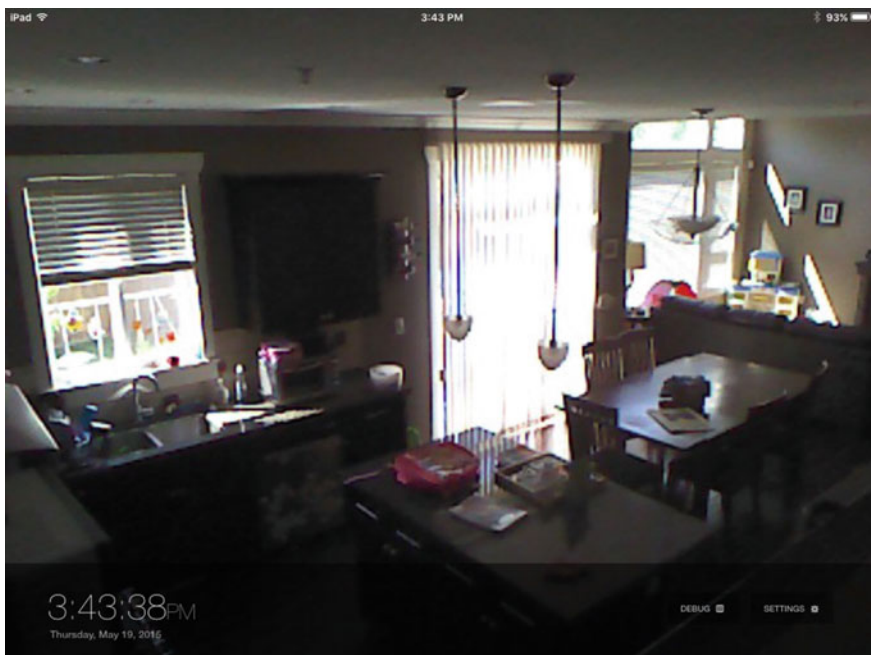

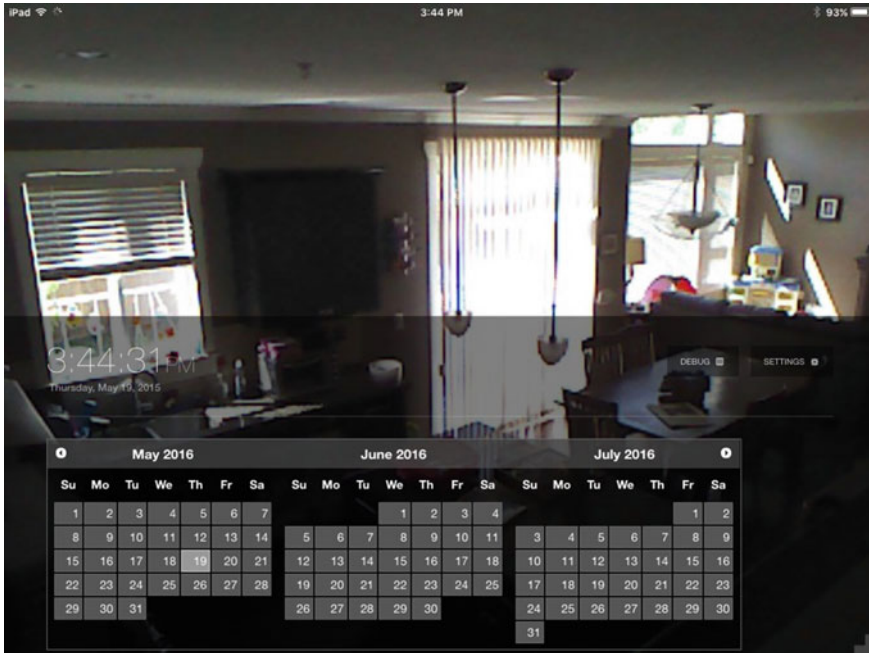**Fig. 4** Close-up of the Moments display

Fig. 5 Calendar selection interface

2.2.2 More Than just One with Autobiographical Design

Autobiographical design focuses on the study and design of technologies created for oneself and used by oneself [13]. It is this tight coupling of design and use that makes it a valuable method for exploring a design space. Yet often it is the case that more than just a single person is involved in a given research project. As a university professor, my role is to conduct research; however, in conjunction I also train and mentor students as researchers themselves. As mentioned, DeBrincat was an undergraduate researcher who worked very deeply on the Moments project by exploring the design space and iteratively implementing the system. This meant that our growing understanding of the design space had to be shared. Initially, I told DeBrincat about my vision for creating a system to record my family's everyday activities in the home. DeBrincat and I had several brainstorming sessions as part of weekly meetings where I would explain the needs I had for a system like Moments and what family life was like for me. DeBrincat used his own experiences growing up to understand the context for which he would be designing and my explanations of the needs for my family. As DeBrincat created the system, he had to make me aware of what was technologically feasible, what features were being created, and which were ready for my family to try it. As I used the system with my family, I had to share knowledge with DeBrincat about how the design was working and where it

needed tweaks and additional work. Once the design solidified, DeBrincat completed his portion of the project.

My family and I continued to use the design for the remainder of two years. This allowed us to gain a very deep understanding of how the technology impacted family life, what worked well about it, and where challenges lay. Such long-term usage and deep experiential understanding are very difficult to achieve through other types of deployments that might include external families. It was for these reasons that I chose to use autobiographical design: I had a genuine need for the system and wanted to obtain a detail and nuanced understanding of the technology and its impact. Twenty months into our usage of Moments, I had my PhD Student, Yasamin Heshmat, join the project to help assess the overall experience that my family was having. As family members we all had a detailed understanding of how we used Moments and how it affected family life, but I wanted to have someone work with us to be able to articulate those experiences and 'tease them out of us', so to speak. Heshmat planned an interview-based study that involved talking with each family member about their experiences. I worked with her to plan out what questions would be most relevant to ask based on my background as an HCI researcher and my knowledge of the system. Heshmat augmented this with things that she thought would be interesting to learn more about.

Having other researchers work on the Moments project was extremely valuable as it brought additional help and varied perspectives into creating the technology and understanding the design space. But it did mean that autobiographical design was more challenging to use as a design research approach. In other autobiographical design projects that I have undertaken [25, 26], I have taken on multiple roles, including the designer, developer, and researcher of the system. That is, I have figured out what to build, I have built it, and I have studied its usage. Maintaining multiple roles meant that I gained a tremendous amount of deep understanding as to what was needed in the systems and why it was needed. In many moments, this knowledge was hard to articulate. And, given that I was the only person doing the work, I often did not need to. I could simply iterate the design based on how I was using it. However, with Moments it was different. I had to pay particular attention to convey my understanding of the design space to the two students I was working with, at different points in time. We had to create boundary objects that helped us share our understanding. For DeBrincat's design and development work, it included sketches and write-ups of features and experiences. It also included one-on-one conversations (undocumented) of what both DeBrincat and I thought of the design and its features. For Heshmat's study work, boundary objects included study protocols, interview questions, and subsequent analysis documents with transcripts, labels, and codes depicting results. The lesson we learned throughout the experience with Moments was that autobiographical design can be used with multiple people where not all have a genuine need for the design and not all use it. However, the takeaway message is that *all team members must be invested in the design process and be able to find ways to share knowledge and understanding across multiple roles in the project.*

2.2.3 Connecting Across Time Periods

With Moments, we were able to use the design over what one might consider in the field of HCI to be a very long time, two years. Many field studies are conducted over a period of weeks, in comparison. Because I was designing for myself and my family, it was easy to have a long-term investment in the work. Moreover, the genuine need we had for the system meant that it was worth any additional efforts that might be needed to keep the system going and maintained over a long time period. Because Moments tried to tie family moments together across time, it was the long-term usage of Moments that raised additional curiosity and insights. We found that the most interesting point in time for Moments was once we had used the design for a full year. At that point, rather than allow users to pick a certain day to view, we could set it to automatically show our family's activities from exactly one year ago, by default. On holidays like Christmas, New Year's and birthdays, my family members and I would look to see how we were celebrating the holiday last year, e.g., who was at our house, what we were eating, and what the birthday cake looked like. Because the system itself tied its usage to time, we were able to more deeply learn about how our family changed over time. Of course, long-term usage can be extremely challenging to achieve. The system needs to stay running, and, in our case, it needed to have enough storage space to keep recording video. As a family, we needed to ensure the benefit of the system continued to outweigh possible privacy concerns. Team members may also easily come and go in an academic environment as students graduate. Thus, the lesson is that *long-term usage can be very valuable to see behavior changes, yet many real-world pragmatic constraints could make it difficult to achieve long-term usage.*

2.2.4 Ending the Autobiographical Design Study

In academia, every project comes to an end at some point. Students move on. Research grants finish up. Professors decide to move on to new interests. After two years, I decided that it was the right time to complete the project. The hardware that we were using was becoming obsolete and we were running out of storage space for video. The camera was not capturing video at a fidelity that seemed sufficient for continued use. We could have conceivably purchased new equipment, yet it would have been hard to properly integrate it within the system, especially considering that DeBrincat was no longer a student. Updates would have been costly in personnel and equipment. I also asked myself as a researcher, even though I valued the system for my family and our ability to capture a record of our lives, had I learned as much as we could about the design space that it was time to move on? This was a difficult question to answer, but ultimately, I decided that I had an obligation to the research funding to end the work and move on. A challenge with autobiographical design in academia is that *one's genuine need for a system becomes intermixed with research funding, graduate student training and completion, and the pragmatics of research.* This is somewhat of an ethical dilemma as one is often publicly funded as an academic, and

there are needs to properly use resources as part of research. I was fortunate in that this project did not require much funding to conduct. Equipment was reused from prior projects, and much of the student efforts were a part of course work. In other autobiographical design works, I have done, I have similarly had to weigh options around resources and time, and whether it is worth continuing on a project [25, 26].

2.3   Autobiographical Design: Living in a Prototype

The last case we present is an autobiographical design project called 'Living in a Prototype' [8]. Since 2013, I (Audrey Desjardins) have been engaged in the long and slow process of converting a cargo van into a livable space: a camper van. In October 2013, my partner and I bought a new Mercedes Sprinter van (Fig. 6 left) which offered an empty space of 10 feet long, 6 feet wide and 6 feet tall behind the seats. In 2016, I wrote about the van to show an alternative to top-down visions of one-size-fits-all smart homes, a topic often discussed in the HCI community. While the van itself and our builds are not using emerging technologies such as Internet of Things devices or wearables, the way in which we 'made home' allowed me to think and write about the home as an invariably unfinished space—a space that relies on the ongoing development of trust, care, intimacy, and sense of ownership between the home, things in the home, and home dwellers.

Living in a Prototype followed an autobiographical design approach. This means that as a researcher, I was also playing the roles of designer, maker, observer, writer, user, and partner. The study was conducted by analyzing the design decisions we

Fig. 6 Cargo van on day 1 (left) and interior of the van in 2016, after wall insulation and paneling, and storage and bed construction

made about how to build the van, the process of fabrication, as well as our ongoing use of the space. In terms of autobiographical design, I built off of Neustaedter and Senger's definition: *'design research drawing on extensive, genuine usage by those creating or building the system'* [13]. The documentation I collected to build my analysis included:

- Tutorials on the Instructables web platform for each important fabrication stage.
- Photos of each step in the making, including tools and materials. Those photos also show the finished product at each step.
- Seventeen time-lapse videos of each day of building. Photos were taken every 30 s and then assembled to make short videos.
- The Instructables tutorials also hold a record of readers' comments and questions, and my answers.
- Short diary logs that record the dates, places, and important events of the trips made in the van.
- Photos of the van's interior while on trips, focusing on different activities like cooking, eating, playing games, sleeping, and getting ready for outdoor activities.

Since the 2016 paper was published, my partner and I have continued to make additions to the van, for instance, adding a sink and water pump, building more storage above the seats, adding solar panels and alternative batteries, installing ceiling lights, and adding a heater. We are also continuing to use the van, mostly for weekend trips (almost every weekend), and longer vacation trips a couple times a year.

Below, I share three main reflections with regard to its longitudinal first-person methodological approach.

2.3.1   Moving in and Out of 'Research' Mode

Using the van project as a site of inquiry gave me the opportunity to investigate how the 'making of home' might evolve over time. The goal was to look at that practice over time, but the nature of autobiographical design meant that research was not always centered: my research life and personal life blurred and rhythms emerged over time.

While this project started as a personal project, it aligned with my doctoral research interests: I was studying ways in which people live with technology in their homes and how they transformed artifacts through DIY approaches and everyday design [27]. Once I saw the connection, it was a fluid, slow, and slightly ambiguous move to transition from a personal project to a research project. With the help of my advisor Ron Wakkary, I was able to conduct a rigorous retrospective analysis of the design and making process, based on the materials I had already been gathering about the van (i.e., photos, tutorials, time-lapse videos, etc.).

When I finished writing about the project for the CHI 2016 conference and for my dissertation, I felt like I slowly started to think of the van less as research and more as personal (the fact that we lived in it for 2 months on a road trip after my PhD helped with that!). And yet, now and again, reflections about the process, the

method, and the living in the van came in waves and led me to continue to write about the van project as a research project. The first was a collaboration on a book chapter about sustainability and longer-term implications of the 'unfinishedness' of the van, thoughts that continued to bubble up for me as we continue to build the van [28]. The second was a collaboration with a master student at my new university. Aubree Ball, for her master thesis, decided to engage in an autobiographical design project as well. Together, we wrote about the experiences of doing autobiographical design as a meta-reflection around the method [7]. With this paper, it became clear that the long-term nature of autobiographical design allowed me to continue to do research work not only with the making of the van, but also through the writing and the reflecting.

A year or two passed, and I realized my partner and I were in building mode again, adding electricity, a water pump, a heater, and a ladder. As making and designing ramped up, I fell back into my earlier habits of photographing tools, materials, and steps in the making, and I took screen shots of discussions we had over text messaging and chats. I was not sure what I would use this data collection for, but I knew that they might become useful. I continue to have a haunting sense that I will write 'Living in a Prototype II'. Stay tuned.

The lesson here is that *longitudinal first-person research projects have fuzzy boundaries in time and scope. While Neustaedter talked about choosing to conclude the Moments project, I chose to continue to live in this ambiguous and ongoing state of potential research.*

2.3.2   Time Allows for New Modes of Making to Emerge

When we started the van fabrication in 2013, #vanlife was just starting, and there was not much information online about how to convert a van into a camper van. Since then, many tutorials have been created, many YouTube channels have emerged, and #vanlife definitely has a presence on social media. Between 2013 and 2015, we chose to document extensively our process for making the van because we thought we could contribute to this emerging community online.

However, as time went by, in addition to amateurs sharing their processes online, small companies started to emerge to support people in their making process. For instance, Adventure Wagon,[2] a company based in Portland, Oregon, started to create parts and frames that can easily be added to Sprinter Van conversions. This opened up new options for us. Instead of having to build everything from scratch, their battery tray kit allowed us to install alternative batteries and bring electricity in the van, an area we did not have much expertise in (Fig. 7).

In addition to new kits and instructions, I also gained easier access to new tools: we bought a small (and cheap) 3D printer for the home. With it, we were then able to print small parts to fix a few problems in the van. For example, when the heater was installed, the vent did not fit properly. I measured the vent and the angles of the

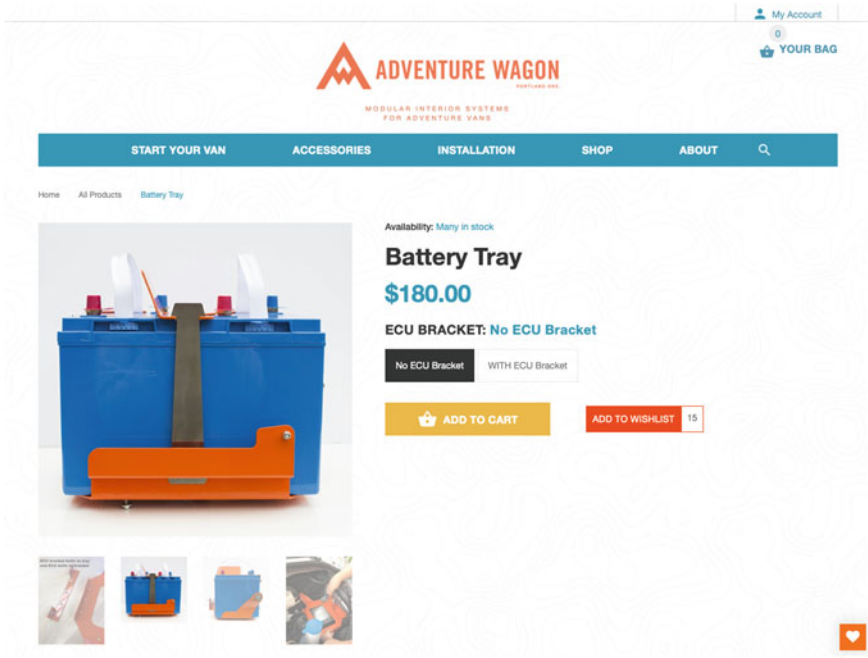---

[2] https://adventurewagon.com/.

Fig. 7 Adventure Wagon Battery Tray kit and instructions now available online

surface it was resting on, designed a new custom-made buffer, printed it at home, and installed it. The proximity and ease to print at home made this process very easy.

Of course, in 7 years, personal changes also happened which also supported new modes of making. I moved from being a PhD student to an assistant professor, gaining more financial means and better stability. For a while we had been dreaming of an integrated diesel heater to replace our portable propane heater (which was less convenient and more dangerous). In 2019, we decided that it was the right time to buy the heater and have an expert install it for us (we did not feel comfortable working directly with the van's diesel tank). The cost of the heater (around US$1000) and the cost of installation (around US$500) would have been difficult to rationalize when I was a student, but not anymore. These changes in personal life meant that new materials and expertise became available.

In my case of longitudinal first-person research, *the slowness of the process and the fact that we still see the van as a prototype allowed for communities to grow and knowledge infrastructures and tools to emerge around us. This is interesting when trying to study how practices of making evolve over time: it means that we cannot study practices in isolation, but that we need to consider how the circumstances of designing and making also change.*

2.3.3 Opportunity for Changes in Theoretical Framings

The research project of Living in a Prototype started from the theoretical underpinnings of everyday design [27], where everyday people are seen as designers of their own artifacts once they leave the manufacturer's and professional designers' hands. In 2016, I framed the project through the perspective of smart homes [8]. In the collaborative chapter from 2018, we used sustainability as a lens to look at place making in the van [28]. Over time, I have found myself revisiting this project through various theoretical framings, producing new insights and new understandings that are relevant to the field.

In the last year, again, I have looked at the van in a new light through new readings and theories I have encountered. In the 2016 paper, I wrote about 'reciprocal shaping' [8] to describe the ways in which we gave form to the van, physically, but in return, its materiality reshaped our ideas of what a van ought to be (does it need electricity right away? Does it need a polished kitchen?). Four years later, thinking alongside new materialism, in particular the book *Vibrant Matter* [29], I can articulate more precisely how artifacts may have as much of an impact on systems or events as humans. In her book, Bennett talks about the notion of 'thing-power' or the liveliness of matter. She writes about the active participation of non-human forces and entities, and she describes how agency is distributed between humans and nonhumans. With this new theoretical lens, I can write about cedar paneling, electricity, skis, tea, my partner, cups, infrastructure, the road, and wilderness landscapes as all the elements that shaped the van. The matter of the van has a vitality of its own that plays an important role in how it comes to be—perhaps as important as our human actions.

Similarly, in thinking alongside feminist theorists (e.g., [30–35], I am able to deepen discussions around authorial perspective and voice in the Living in a Prototype project. From a methodological perspective, autobiographical design renders explicit who the researcher is and forces us to recognize that the knowledge generated from a project is entangled with this person. Feminist theorists have long argued that human knowledge is situated and partial—that knowledge is not abstracted or decontextualized, but instead that it is learned, applied, and understood in situ. In fact, Donna Haraway cautions against knowledge that is disembodied, or, in her words: 'from everywhere and so nowhere' [36]. Understanding the importance of using 'I' when writing about the van project is something I had a hard time articulating at first. However, through a feminist theoretical perspective, I am able to express why it is important to respect (and celebrate) who these insights are coming from, clarifying whose lived experience has formed these new findings. Yet, when I wrote about the van project in 2016, I wrote with the pronoun 'we' to recognize the participation of my partner in the making and living with the van and to also acknowledge the analytical work my advisor contributed to while I was writing. Finding the right tone and voice to respect whose perspective is being shared in longitudinal first-person research is a difficult work, but with a new theoretical framing, I am now able to refine the position I take.

Similar to my previous point, *not only did the making circumstances change over time, but theoretical lenses can also change with time. When working with an*

autobiographical project, so much of the felt experience of living with a prototype needs to be unpacked and finding different theories is often welcome to help sharpen the contribution of a project.

3   Discussion and Conclusions

Across the three projects, we see several main themes emerging in terms of how one should think about and consider first-person methods such as auto-ethnography and autobiographical design in the context of longitudinal research methods.

First, the projects illustrate that there can be a range of participation by individuals when it comes to longitudinal first-person approaches, despite that they focus heavily on an individual's perspective. For example, in *Living Without a Mobile Phone*, as an auto-ethnography, there is a strong emphasis on just one person's perspective. With *Living in a Prototype*, there was a single researcher; however, this role was coupled with the researcher being part of a domestic relation. As a result, Desjardins adjusted her writing practice to include the pronoun 'we' to acknowledge her partner's participation. In *Capturing Memories of Family Life*, Neustaedter was part of a design team with students. Across the projects, there was no one 'right solution' and the nature of who was involved depended on the real-world situation being explored. Participation was also greatly affected by the longitudinal nature of the studies. For Neustaedter, participation changed based on students and graduations over time. For Desjardins, her participation included her partner and her Ph.D. advisor more strongly at some points. And, for Lucero, his non-use of a mobile phone came about from having different situations, students, and activities before him. This was not direct participation per se, but the people around him did, to some extent, influence decisions to not use a phone or suggest that others do the same (e.g., his students). Together, these points illustrate the flexibility of using longitudinal first-person research methods over extended periods of time.

Second, longitudinal first-person research can amount to data collection that is tedious in nature yet highly important. Projects go on for months and years at a time, rendering evident that relying solely on memory is not enough to offer rigorous data. *Living Without a Mobile Phone* included multiple forms of data, including retrospective accounts, reflections-in action, and field notes. *Living in a Prototype* involved media of the design process and ever-changing van, web tutorials, and diary entries. *Capturing Memories of Family Life* utilized design boundary objects due to challenges with working among a small team of researchers that included students in addition to Neustaedter. In all cases, data collection was important for reflections and writing about the projects. Data collection was sometimes for the sole purposes of research. Other times, it was data that was collected for other reasons (e.g., communicating with friends and family, sharing information with an online community). Clearly, data collection is vital for longitudinal first-person research if it is to be understood as being credible, just the same as for other research methods. Yet unlike studies that are of a shorter duration in time, researchers using longitudinal

first-person research methods may need to collect data over very long periods of time, as was the case for the projects reported on in this chapter. Long-term data collection comes with the potential for data collection fatigue, losing data, and challenges by analyzing data across time.

Third, it can be highly valuable to reflect on one's experiences as a part of longitudinal first-person research. Sometimes, it can take time to understand what is happening and why when using longitudinal first-person methods. This might be akin to how a researcher must often 'step back' and think critically about what they are seeing while they analyze their study data. Similar approaches are needed when it comes to longitudinal first-person research. For *Living Without a Mobile Phone*, this came from Lucero's retrospective accounts of his life across the years when he was not using a mobile phone. For *Capturing Memories of Family Life,* reflection came, in particular, once Neustaedter and his family had used Moments for an entire year. This allowed them to look back at their life one year ago and what they were doing with Moments. For *Living in a Prototype*, Desjardins was able to reflect as she moved between her roles of researcher and domestic partner. In all three cases, reflections were made stronger because the researchers participated in the research over a long period of time, building up their understanding as time progressed. This brings added complexity and commitment, yet additional value and experiential understanding. It also means that it can be challenging to write about and tell 'the story' from such a deep, interpersonal level.

Lastly, the three projects reveal opportunities and tensions around when to continue longitudinal first-person research and when to see it to a conclusion. Ultimately, decisions about concluding a research project will depend on the researcher and the particular context being studied. Our chapter reveals several ways to think about it and different perspectives to consider. *Living Without a Mobile Phone* concluded based on personal circumstances and needs to re-engage with a mobile phone. *Capturing Memories of Family Life* concluded based on student training needs and grant funding. And, it would be fair to say that *Living in a Prototype* has temporarily finished, yet there are possibilities for the work to continue moving forward with the use of various theoretical lenses, new additions to the van, and life changes for the couple. We suggest that researchers consider a mixture of their research needs coupled with their own personal needs when it comes to such longitudinal first-person research projects. Researchers should also consider the pragmatics of conducting first-person research, given that first-person research methods tend to naturally involve studies lasting a long time period. This can make it more difficult to fund a project and stay committed to it.

Overall, our three cases have illustrated several lessons and reflections when it comes to conducting longitudinal first-person research. Through these long periods of time, we are able to inquire about how our lives with technologies change. In addition, with this longitudinal first-person position, we can also observe and remark on what else around us changes with time: our families, our jobs, our communities, theories we engage with, and the tools we may use. This is a unique place to be: It opens up the possibility of looking at transformations in the mundane and the everyday within the broader context of fully lived lives, as complex and tangled as they are.

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