

Autobiographical Design in HCI Research: Designing and Learning through Use-It-Yourself

Carman Neustaedter

School of Interactive Arts + Technology
Simon Fraser University
Surrey, BC, Canada
carman_neustaedter@sfu.ca

Phoebe Sengers

Information Science
Cornell University
Ithaca, NY, USA
sengers@cs.cornell.edu

ABSTRACT

Designing a system with yourself as a target user and evaluating the design through your own self-usage is commonly considered a questionable approach in HCI research. Perhaps for this reason, HCI research including extensive self-usage of a design is underdocumented. Yet such self-usage *does* happen and many researchers have found great value in the lessons learned from it. Our goal in this paper is to bring these hidden practices to light and offer guidelines for how HCI researchers can usefully engage in what we term ‘autobiographical design’—design research drawing on extensive, genuine usage by those creating or building a system. Through interviews with HCI experts who have engaged in variations of autobiographical design, we draw out the possibilities and limitations of autobiographical design methods and lay out best practices for its use as an HCI research method.

Author Keywords

Autobiographical design; design research methods

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H.5.2 [Information interfaces and presentation]: User Interfaces – Evaluation/methodology;

INTRODUCTION

User-centered design is a cornerstone of the field of HCI, since incorporating users in the design process can lead to better systems [35]. There are many methods for incorporating end users into design research, ranging from participatory design to lab or field evaluations [35]. There are also design methods that focus on individual, idiosyncratic experiences as a basis for design. Cooper, for example, emphasizes “designing for one” through creating personas, or fictional characterizations of specific users [11]. Others argue that designers should focus on *non*-typical users such as extreme characters [14], atypical user groups [23], or lead users [42] as a source of innovation.

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But what about when those individual users are the researchers or designers themselves? Nobody would contest that designers, developers, and researchers frequently use their own systems during design in order to test concepts, learn through actual usage, or find and fix software bugs. In fact, many would argue this is an important step *before* putting the design before other end users. Though never truly formalized as a research method, such “eat your own dog food” methods have been applied in industry for years [10,15]. Beyond this, some systems are used throughout their design based on designers’ or researchers’ real needs. For example, early research from CSCW reported many lessons from media spaces based on technologists’ use of their own systems or that of their colleagues, based on intensive and authentic self-usage (e.g., [7,16,33]).

Despite these examples of learning and designing through self-usage, we know of few accounts of this as a reported HCI research method (the notable exception is [17]). In fact, HCI research methodologies focusing on researchers’ own experiences as users of a system may seem heretical to both the ethical goal of user-centered design and the epistemological goal of basing research in HCI on objective, third-party knowledge. Yet self-usage by researchers *does* happen, whether it is reported or not. Thus, as a community, we feel it is important that we better understand this method and how it should be used.

Our goal, then, is to shed light on the research practice that we term **autobiographical design**: *design research drawing on extensive, genuine usage by those creating or building the system*. (By ‘genuine’ usage we mean it is based on true needs of the researchers, rather than them pretending to have needs expected of targeted users). We chose the term ‘autobiographical design’ as we felt a core attribute of the method is that a researcher or designer’s own experiences are embodied in the design of a system and its exploration. That is, as the researcher(s) build the system, they use it themselves, learn about the design space, and evaluate and iterate the design based on their own experiences. Within this definition, there are certainly nuances, and our paper explores these.

Our interest in this topic began with our own projects. Neustaedter designed two systems for himself and his family, using and studying each system over the course of a year [27,34]. Sengers used a similar approach for three

years to design and evaluate a social system for the workplace [5]. Our stance in coming to autobiographical design was different; Sengers had intended this as a central concept of her project, while Neustaedter had used autobiographical design simply as an early exploratory method and was surprised to discover how much he learned. While our experiences had clearly demonstrated value in autobiographical design, our case studies were not enough to understand the full scope, possibilities, and limitations of the method. Thus, we interviewed other HCI experts who engaged in self-usage as part of their design research. Based on our interviews and our own experiences, we analyze the strengths and weaknesses of the method, articulate best practices for applying the method, and argue that, and under which circumstances, autobiographical design can be a useful and suitable HCI research method.

We caution that we are not articulating a “dogfooding” approach. As we will describe, autobiographical design goes beyond simply using a system to test for bugs or validate the system before presenting it to end-users. It involves long-term, genuine use. We also are not attempting to glorify autobiographical design. Instead, we are trying to bring to light an *already* common method for conducting HCI research, and understand and document its validity and usefulness as a research methodology so that other HCI researchers can use it effectively as a part of their research.

EXPERT INTERVIEWS

Recruitment and Respondent Selection

We investigated autobiographical design by interviewing experts from the HCI community who had experience in using some form of the method. We iteratively contacted and interviewed HCI community members in person or via telephone over several rounds (a standard qualitative interview practice). We started with six interviews and added to this number until we stopped seeing new insights emerge. We contacted 20 people in total, 11 of whom agreed to be interviewed. Contacts were selected because we had heard or were told by others that they had engaged in a design process similar to autobiographical design. We purposefully aimed for senior people from HCI research who had published their work in top-tier conferences or journals, to allow us to understand autobiographical design from established researchers who “knew what they were doing” as opposed to novices who might have done so by mistake. We also sought diverse backgrounds in our respondents to get a variety of disciplinary perspectives (e.g., computer science, design, information science) and institutional perspectives (e.g., academia vs. industrial labs). Our relationship with respondents varied: some we knew well, others were acquaintances, and some we had never met. Regardless of our relationship with the respondent, each was interviewed in the same manner.

The interviews revealed respondents’ practices involving self-usage as well as their expert opinions on the approach.

Our interviews should be understood as an intellectual discussion with experts in the area as opposed to a social science study. As such, participation was non-anonymous, allowing us to credit participants for their intellectual contributions, to discuss their work in detail, and to help readers evaluate their qualifications. In our results section, we describe participants’ views on autobiographical design; in the discussion section we present our own conclusions.

Interview Method

While the interviews were a form of intellectual conversation, this was not simply an informal chat amongst friends. Prior to our interviews we developed a set of common interview questions. We piloted these questions by interviewing each other, as we were previously unfamiliar with each other’s work in the area. Questions asked respondents to describe systems they had designed that involved self-usage, the design process of one of these systems in detail, and their thoughts about autobiographical design more generally. For example, questions included what steps they took to design and use the system, what challenges or successes they had, and whether they had instances where designing for themselves did not work well. Interviews were semi-structured, diverging from the initial question list as necessary to understand and document the respondents’ complete views on the topic. Interviews lasted between 45 and 90 minutes.

Table 1 provides a means to navigate our interviews. Respondents are listed in alphabetical order, along with the types of systems they designed with self-usage and the focal system discussed in each interview. Systems are classified by type, highlighting their diversity. Even though systems are listed with paper citations, rarely was the self-usage documented in the paper. Instead, publications focused on other aspects of the research.

Data Collection and Analysis

We audio recorded and transcribed all but two interviews; in two cases, our audio recording device failed. We also kept handwritten or typed notes. Each author conducted half of the interviews and inductively analyzed them using standard qualitative coding practices to draw out important themes; we found substantial overlap between our codes and themes. Nevertheless, we highlight that our goal was not to find average or typical results, but rather to identify and integrate or contrast experts’ insights to help us understand the process of autobiographical design better. The number of interviewees does not, and is not intended to, support statistical reasoning.

Our results are divided into three sections: (1) design practices that people commonly use as part of an autobiographical design approach; (2) types of knowledge people felt was possible and impossible to achieve through self-usage in design; (3) how respondents experienced ethical dimensions of autobiographical design.

Respondent	Organization	Types of Self-Usage Systems	System Focus for Interview
Gregory Abowd Professor, Interactive Computing	Georgia Tech	Classroom [1], Tour guide [2], Memory [3], Health [28]	Health System: Avaris supported a training intervention for his autistic son, which Abowd and his son's therapists used for about 4 months [28].
Dan Cosley Assistant Professor, Information Science	Cornell University	Memory [37]	Memory System: Pensieve sends triggers for reminiscing based on the content of social media [37]. It was built for Cosley's personal needs and expanded to a public version.
Tom Erickson Interaction Designer & Researcher	IBM T.J. Watson	Information [17], Chat [6]	Information Management System: Proteus was a digital notebook that Erickson designed and used over a period of 5 years at Apple [17]. It was built solely for his personal needs.
Bill Gaver Professor of Design	Goldsmiths, University of London	Media Space [18]	Media Space: The Video Window provides Gaver and his family with views surrounding his home [18]. Used since 2004, also installed in a private residence and nursing home.
Steve Harrison Professor of Practice	Computer Science, Virginia Tech	Media Space [7], Media Space [24], Various	Media Space: The Draw Stream Station allowed users to share ephemeral objects over distance in collaborative design [24]. Design team used it for several months at Xerox PARC.
Saul Greenberg Professor, Computer Science	University of Calgary	Toolkit [21], Media Space [41], Photos [36]	Media Space: The MEdia Space connects Greenberg's home and campus offices so students can interact with him when he telecommutes [41]. Used since 2008.
Carl Gutwin Professor, Computer Science	University of Saskatchewan	Toolkit [13], Media Space [29]	Programming Toolkit: GT is a groupware toolkit for rapidly prototyping CSCW applications [13]. Used and designed by Gutwin and his students for over 10 years.
Wendy Kellogg Manager	IBM T.J. Watson	Chat [6], Various	Chat System: Babble was a communication system [6] used by Kellogg and her group for 5 years and deployed to others.
Henry Lieberman Research Scientist	Media Lab, MIT	None	Designs were inspired from his own experiences but he never used any. Thus, there was no focal system discussed.
Reid Priedhorsky Research Staff	IBM Cambridge	Navigation [38]	Navigation System: Cyclopath is a geowiki for bicycle route navigation [38]. Designed and used since 2006.
Steve Whittaker Professor, Psychology	UC Santa Cruz	Voicemail [44], Various	Voicemail System: ScanMail was a voicemail annotation system [44]. Used by Whittaker and the design team for 18 months at AT&T Research and then deployed to others.

Table 1. Interview respondents and described systems.

RESULTS: SELF-USAGE PRACTICES

All but one respondent included intensive self-usage as part of their design research for at least one design, while their practices varied in formality and rigor. Lieberman was the exception; he was inspired by his personal experience, but did not use the resulting systems himself [31,32,43]. Thus, he did not do autobiographical design, but his comments resonated with others' and aided our understanding.

We saw several non-mutually exclusive categories emerge in terms of respondents' practices. In some cases, the researcher was part of a design team where all members used the system; sometimes only some of the design team used the system; and sometimes a researcher worked alone. In one case [17], the researcher was the only user of the

system, but in all others, researchers used the system with their work group, alongside other users, or with their families. We also found self-usage at different points in the research/design process: some used it only in the early phases while others used it throughout. About half of our respondents reported self-usage in the initial stages of design before moving on to test their systems with other users once the system became stable. In our opinion, these variations all fit within our definition of autobiographical design. Next we look at the practices that respondents utilized to benefit the most from autobiographical design.

Autobiographical design supports fast tinkering

Most of our respondents told us that autobiographical design allowed them to tie cycles of design tightly with

actual, intensive usage, because they could incorporate real end users (themselves) early in the design process without creating a complete system. This supported an extensive period of tinkering with the design, making frequent small changes based on what they experienced.

This tinkering practice supported responding both to formalizable aspects of usage and to less formalized intuitions and feelings drawn from experience. For example, because Greenberg was the primary designer *and* user of the MEdia Space [41], he noticed needed changes to it could act on these needs immediately by discussing them with his students, who would do the programming. It was fast to see and fast to act on design needs. Design changes could be done in a few days or less. Priedhorsky contrasted autobiographical-user involvement with other user-centered design techniques, such as usability studies or interviews, which he has found are not able to incorporate real end users as early in the design process:

"Any design process benefits from having an end user on the team...and the reason for that is that it shortens the feedback cycle... if you have somebody in the community on your team, they are right there, you can just ask them. If you don't have someone on the team you have to go to your panel or interview someone...it's just longer."

The caveat, as both Gutwin and Erickson pointed out, is that the researcher/user has to be capable of and enjoy building things or s/he won't be able to easily iterate on the design as part of this tinkering process.

Autobiographical design requires real systems

Respondents told us that autobiographical design allowed them to rapidly start using their designs in order to learn from them because they could sideline some usability or finishing issues that may otherwise be time-consuming. Conversely, they also said that autobiographical design requires building a system that really works, not just in test cases, because the design *is* actually being used.

In some cases, an end-to-end system can be simple to create and still fulfill the basic need for the system. For example, for the MEdia Space [41], Greenberg described initially creating a basic system that transmitted video between two locations. This was enough to begin exploring system usage before they incorporated a wider feature set. On the other extreme, some systems require complexity from the beginning in order to be used for real. For example, Whittaker's design team had to create a complete voicemail system before it could be used in the simplest case because it was replacing the standard voicemail system:

"This is a generic problem with building systems for ourselves. You do need to have an end-to-end system, in particular if you are trying to substitute something that is really important to people."

Greenberg and Gutwin highlighted that an autobiographical design approach is only possible if there are no technical

hurdles to creating the system, such as dealing with infrastructure. For example, Gutwin described a failed attempt at autobiographical design because of infrastructure issues. In this case, he created a shared drawing application for his child and the child's friend that would connect between their homes. They tried using it over several weeks but it continually lost network connectivity rendering it too "painful" to continue as a project.

Together, these findings suggest that autobiographical design may be most effective when an initial, simple system can be quickly created and useful so that genuine usage can begin almost immediately.

Autobiographical design best with genuine needs

Most respondents reported that they had genuine needs for the system they were designing and strongly advocated that autobiographical design should only be done in these situations. Gaver, for example, described autobiographical design as being appropriate "where [researchers'] motivation for doing it doesn't depend on the fact that they might get research points for it. In other words, where there's a... genuine... interest in the content of the thing." Erickson felt genuine usage was the main distinction between autobiographical design and "dogfooding:"

"What I think of when I think of genuine usage is that you have this real goal or often a set of interweaved goals that you are really using the system to pursue. I think that genuine usage is ... really valuable because it causes you to use the system and try to integrate it with other parts of your life in practice in ways that you wouldn't tend to if you were just trying to test it."

Greenberg similarly said that if the need for a system is only discretionary, then you may not really use the system much and the resulting understanding is correspondingly limited. Respondents repeatedly insisted that genuine need should not be faked, and that real usage is essential for the benefits that autobiographical design provides.

Some of our respondents mentioned that in collaborations, sometimes the design team member who is building the system is not the one who is actually using it or has the real need for it. Several felt that autobiographical design works best when the "builder" *is* the person with the need for the system, mentioning difficulties that arose otherwise. Greenberg described a digital photo browsing system [36] that he designed with a student developer to make it easy for families to find digital photos. It was challenging for Greenberg to articulate the design needs for the system to the student because they were driven by Greenberg's practices of printed-photo sharing and not the student's online sharing. Cosley similarly mentioned difficulties in transferring the motivation behind an autobiographical project to a student who did not have the same needs.

Autobiographical design leverages long-term usage

Almost all of our respondents used their systems for over a year. Such long-term evaluation is unusual in HCI, and, as respondents reported, it allowed them to deeply understand the effects of the system on real practice as opposed to novelty effects. Whittaker argued that such real usage can be difficult to uncover with other techniques:

"If you want very very long term evaluations, that is extremely difficult to do, then it's extremely important to follow an approach like Tom Erickson's. In practical terms, you're just not going to get that kind of data from someone who just signed up for the process...if you're trying to study these things in the long term, then you may end up having to use this type of approach for practical reasons."

Erickson argues that this long term, real usage helps understand practice holistically:

"Life isn't very well segmented or siloed. In reality, [our] daily practices bleed across boundaries. I think the genuine use allows you to tap into that and build applications or systems that are more permeable in some sense, that accommodate the fluidity of your everyday use."

Record keeping and data collection unusual

Most respondents reported keeping no explicit, formalized records of their own use. Gaver, for example, who had not intended for his system to be research, reported that his first written records were the final research paper. Other respondents described similar stories: because autobiographical design was not considered an accepted research method, they often did not see the need to keep written or visual records of their usage. Typically, the only real record of usage was the actual design changes made to the system as a result. Sometimes these were recorded in code repositories, but these records were typically not looked back on to understand design usage or evolution.

The only respondent to keep explicit records was Erickson, who emphasized the importance of this in his comments:

"I tried to be disciplined about this. One thing I tried to do was keep regular notes on how I was using it and reflections on it...what surprised me and what didn't, what worked and what didn't...one other thing that is very useful is the ability to look back. So, for example, at some point, again pretty early on, I built in a logging mechanism so that I could track how much I used certain features."

RESULTS: LEARNING FROM SELF-USE

In HCI, evaluation with other users is the gold standard for establishing knowledge about a system. Yet our respondents felt that they had learned a great deal by trying a system themselves, although the nature of the knowledge sometimes differed from third-party evaluations. In this section, we describe how and what respondents felt it is possible to learn from using systems themselves.

Autobiographical design doesn't prove generalizability

All respondents emphasized strongly that one thing that autobiographical design *cannot* do is produce results known to be generalizable to a broader community of users. Certainly other people may appropriate a technology in unexpected ways, or a technology's design may be too tied to one person's practices. This occurred in system designs by Erickson, Greenberg, and Abowd where the final system was tied closely to their idiosyncratic needs, rather than that of a larger audience. Building on this, Erickson argues for other approaches to complement autobiographical design:

"What you really want to do is get people to do autobiographical design and have them be able to say, okay, I know I am doing this for myself, I know one of the almost inevitable consequences of this is that its going to work really well for me but there are going to be other users or teams that use it in ways that I don't expect and so what can I do to think about ways to generalize it. You can do everything from traditional methods like heuristic evaluation... you can do end user testing... there are lots of ways to address some of the shortcomings of autobiographical design as long as you're aware of the shortcomings in the first place."

Gaver suggests that autobiographical design provides other worthy lessons not focused on generalizability.

"[I]f what you're trying to do with it is to generalize to other people and... make a product or something like that, then yeah, you want to test it out with other people. But in the case of the Video Window, especially when I wrote that paper, I wrote that as an autobiographical piece where I was trying to talk about my particular experience with that piece. I feel like people can draw their own lessons from that in the way you do for any particular case study."

In the next sections, we look at the understandings that autobiographical design *can* provide.

Autobiographical design reveals 'big effects'

Respondents found that autobiographical design allowed them to see "big effects"—major things that could make or break a system, and genuine, as opposed to discretionary, needs. For example, in Greenberg's case, he learned within days of using his MEdia Space that camera placement was critical for its success. On the other hand, if the system was being deployed with a different set of end users, Greenberg felt he would be less likely to notice the importance of something so simple as camera placement:

"You get to see what matters...being the key user anchors you to what matters and what doesn't matter...The things you see when you use it yourself are the big things, you don't need a deployment, you will see this stuff."

Sometimes big effects were surprises in usage. Intuitively, one would expect that it would be difficult to be surprised by one's own usage of a system that one had designed. Yet some respondents reported that their practices sometimes

violated their design expectations, leading to better understanding. Erickson, for example, reported that

"[o]ne of the very early experiences I had was working really hard to put in something I wanted and then discovering, oh well, now that I have it here this wasn't really useful in the way that I thought."

Harrison described learning big effects in the design and use of the original Media Space at PARC. The system was originally designed to make it easier to conduct meetings across locations. Through their own usage, however, the Media Space took on a new usage pattern where it became an always-on portal for maintaining awareness of remote colleagues. Thus, the main use for the system changed dramatically and this was obvious through their own usage.

Detailed and experiential understanding

Several respondents felt that autobiographical design allowed them to uncover detailed, subtle understandings that they likely wouldn't have found with other user-centered design techniques because they might seem unremarkable. Some participants described this as personal, experiential knowledge that they developed through autobiographical design. This was enabled both because of the large amount and quality of time they spent with the system (perhaps equivalent to an ethnographer living at a user's home or shadowing them throughout their workday) and also because of their first-person perspective on it [see also 26].

Abowd, for example, said that his motivation for designing a system for his own autistic son was to understand this space deeply before he designed for others. He felt his personal experiences gave him a true, deep understanding of the situation of use that would be difficult to achieve otherwise. Gaver described how his usage caused him to notice his feelings about the design, in particular after it had broken for a while and came back up: *"Then the other thing was also very interesting was the experience of getting it back again because it was really nice to have it back. It was really – it's like, I don't know, having an old friend back in your house."*

Such personal, experiential understanding then becomes a resource for design. Cosley, for example, mentioned that his own reactions to the system helped him to think through design decisions, although these were sometimes overruled by other members of the design team. Nonetheless, autobiographical design brought him increased passion and commitment to his research: *"I think designing things that are going to affect you makes you more interested, more avid, stronger, more dogged...."*

Several respondents commented that because they had a detailed understanding of the system's usage, they could critically reflect on the design when writing about it. Kellogg described this as *"a form of reflective design."*

Autobiographical design supports early innovation

Respondents described many types of systems where self-usage was useful (see Table 1, Column 3). As a research method, they reported that autobiographical design seemed best-suited for exploratory systems that filled a new design niche, i.e., where there was no existing system or established culture of use. If a system already existed to fulfill a need, respondents said it would be difficult to achieve genuine usage. Thus, they saw autobiographical design as appropriate for learning at the early stages of innovation where proof of generalizability is less important.

"I think it's in cases where it is not a well understood problem... in cases where there are well understood flaws, it is useful to do self-based design to just kind of get rid of fundamental problems, but I think it is much less useful in cases where you are trying to build a system that is [replacing an existing system]. Things don't occur to you in initial design because the space isn't well understood and it's only when you actually have the system in place that you discover what the fundamental flaws are and what the possibilities are."- Whittaker

Several respondents told us that autobiographical design led to uniquely new design ideas. Although autobiographical design was generally said to support innovation, Cosley and Erickson felt autobiographical design could *hurt* innovation if a designer focuses too strongly on a single perspective.

Outsider perspectives are useful (sometimes)

As a counterbalance to the aspects of autobiographical design focused on oneself, some respondents said it can be helpful to have non-users (e.g., colleagues, supervisors, professors) or secondary users (e.g., colleagues, family members) critique design ideas as they are put into the design. Erickson suggested having a devil's advocate assigned to critique ideas, while Priedhorsky's advisor screened his design features.

Additional lessons can also come after moving from autobiographical design to broader user testing. For example, it wasn't until Whittaker's team gave ScanMail to other users that they realized they had misconstrued how voicemail was used: people didn't just want to check it in one location, they wanted to check it in several locations. This happened even though the design team initially did a thorough requirements analysis. *"There was a significant distinction added as a result of other people using it... that wasn't something we had thought of.... I guess you get lost into a particular way of thinking about the problem."*

Even so, it is not always the case that testing with additional users will produce new understanding. For example, Gaver told us that when they deployed the Video Window more broadly, the experiential results had all been anticipated by his own use. The deployment did, however, cause the team to think about new issues such as safety and reliability.

RESULTS: AN ETHICS OF SELF-USE

In this section, we describe how respondents experienced ethical aspects of autobiographical design.

Autobiographical design leads to ethical struggles

Daston argues that throughout the history of science, the production of scientific knowledge has been tied to ideas around moral norms for the behavior of scientists [12]. It was not our intention to interview respondents about the ethics of autobiographical design, yet epistemological concerns of what one can know through autobiographical design were tightly coupled in our respondents' comments to ethical concerns. Are researchers 'cheating' when they test on themselves? Is autobiographical design inherently biased through personal motivation?

While our respondents generally felt the answer to these questions, at least under the correct circumstances, was no, they still struggled with them. For example, Gaver experienced an uncomfortable tension between his personal interests in the system and a professional ethic:

"I would repeat the way it worked with the Video Window, ... I would design something for my home because I want it, and then I might be willing to consider publishing it, but I would want the motivation to be one of doing something for my home, not one of generating a new publication."

Abowd mentioned struggles around feeling selfish for pursuing projects related to his own needs. Kellogg objected to the term 'autobiographical design' and referred to a similar perception of selfishness:

"I just think of it, not as designing for myself and then foisting it off on others, but usually we're designing with others in mind and if we can use it ourselves for something real that gives us access to this huge, rich..., set of feedbacks, insights, that's valuable in design."

Respondents sometimes referred to a self-vigilance required to overcome what they perceived as the potential for bias.

"There's kind of a constant struggle to ensure that there's no bias. I'm a member of the target community but I also have tremendous access and influence to what happens in the system and, you know, it's not appropriate for me to abuse that access... it's sometimes difficult to untangle my own opinions as a member of the community and be objective." - Priedhorsky

Abowd similarly felt that if you are using your own experience, you have to be able to recognize your own emotional investment or agenda and be what he termed "objective" about it.

Autobiographical design makes implications real

In contrast to the prior comments relating to potentially negative ethical consequences, respondents also described ways in which they felt autobiographical design made them more responsible designers because they felt the personal impact of their systems. Abowd saw his self-usage as

putting himself "in harm's way." He used Avaris for his son, so he had a personal stake to make sure not to mess up his son's therapy; there were real potential costs because the usage was real. Harrison described a strong feeling of responsibility to fix the design if it had a negative impact, a sense of urgency that may not be present when designing for someone else. Gutwin faced a similar reality when his team designed their toolkit: *"You are confronted with your design decisions in a very intimate way when you use an API you designed...you really really care about getting it to work right."* Gaver similarly talked about how the process of modifying his own house and potentially being embarrassed in front of his neighbours by the installation made the weight of what he was doing different.

Researchers self-edit results for reviewers

In order to more systematically understand broader attitudes towards autobiographical design in the HCI community, we asked respondents what reactions they received in the review process to this aspect of their work. Surprisingly, very few of the respondents reported any negative reviews about the autobiographical aspect of their work. Instead, such potential effects were often sidestepped through a self-editing process, where authors limited talk about self-design in their papers because of a general sense that reviewers would consider it bad practice.

"You know, from a sort of very tactical point of view, there are people who just will not accept the idea of experimenting and designing on yourself, and the scientific community, if your goal is to reach those people, then self-design's kind of self-destructive." - Cosley

Respondents described various negative reactions that they expected reviewers to have. Kellogg, for example, described a possible reaction as *"it was successful because we used it, and it was successful for us, you know, that's cheating."* The Babble team avoided this by interleaving stories of their own use with stories of others' use to make clear they had not only relied on their own experiences. Gaver described *"the common attack against designing for yourself"* as *"you might be biased about how you portray needs for something by the fact that you think you might get a reward for it."* This led him to emphasize that researchers must have a genuine interest in the system. Whittaker focused publication of ScanMail on use by other users and not their own. Harrison suggested finding a non-user who understands the idea and believes in it to champion it, or moving on to broader testing with "obvious adopters." Other respondents also suggested broader user studies to avoid reviewer criticisms despite believing they were not, in principle, necessary. Lieberman, for example, conducts usability tests for pragmatic reasons despite famously opposing their necessity [30].

The downside of these self-editing strategies is that important parts of the research may remain unreported. Abowd argued that it is important for designers to be

explicit about their own commitments and motivations for the work. Presenting the true design process allows reviewers to better judge the work. Abowd was open about his own commitments and got little negative reaction, although he believes that may be because reviewers were focused on potential social benefits. His experiences of the benefits of full disclosure, at least for motivating systems, were seconded by Gaver, Cosley, and Lieberman.

DISCUSSION

So far, we have outlined our participants' views; in this section we describe our analysis that emerged from these discussions as well as our own experiences with autobiographical design. In broad outline, our experiences mirrored those of our respondents; for us, too, autobiographical design was marked by intensive tinkering in response to our personal experiences with the system, including moments where our own use surprised us. In contrast to most of the respondents, we both used extensive data collection including tracking system usage, documenting changes to the code, and communal blogs shared among project participants to keep track of our developing experiences with the system. Sengers recruited an outside evaluator to collect and co-analyze this data. Neustaedter did subsequent user studies to validate his findings but found they confirmed what he already knew.

In understanding the implications of autobiographical design, we first draw a distinction between *design practice* that focuses on creating innovative designs, and *design research* that also produces new social, cultural, and/or technical understanding through design and its evaluation [45]. While the focus of our paper is on the latter—*design research* in HCI—it is valuable to contrast this with the role of self-usage in design practice. It is common in the design community for designers to rely on their own design intuition when creating new products and many will use their own designs in early design stages. Some might call this 'dogfooding' and others simply call it 'design.' Here designers utilize a repertoire of (often tacit) knowledge learned through years of schooling and/or professional experience to guide their design decisions [40]. This is considered allowable practice and why not? Designers have a wealth of knowledge and this should be utilized as part of design processes. Yet turning to design research in HCI, such self-usage becomes highly contested, if not heretical, especially in publications. Here the accepted norm is that studies of design (e.g., participatory design, controlled lab studies, field trials) must include third-party end users.

However, we currently see two juxtaposed trends. First, there appears to be an increasing requirement that design research in HCI includes formal evaluation in order to be published [4]. One interpretation of this is that we now more than ever want to understand how designs are being used, how they become part of broader culture, and whether or not they effectively support user needs. Yet contrast this with the second trend: it is becoming increasingly difficult

to conduct formal evaluations as a part of HCI research. The proliferation of ubiquitous computing technologies has meant that system designs are increasingly part of a rich socio-technical culture involving multiple people, places, and devices [4,9,20]. This is difficult to design for and also to study. Moreover, the frailty of new prototypes makes it difficult to evaluate such designs, especially in a real world context over an extended period of time [4,20,22]. Shorter-term usability evaluations that take place in the controlled confines of a research laboratory are unable to explore how new technologies will evolve and be used by a culture over time [20]. Even when a technology is 'ready' for field trials, these tend to be in the range of 3-6 weeks, which questions their ability to truly uncover long-term adoption and patterns of real usage.

We argue, then, that autobiographical design as an HCI research method can help combat this problem. In many situations autobiographical design can provide detailed, nuanced, and experiential understanding of a design space. This can be done early in the design process to tinker with an idea, over extended periods of time from months to years to learn about long-term adoption and real usage, and when it might otherwise be difficult to deploy a design because of technical complexities. Genuine usage is hard to come by in the early design stages through typical user-centered design practices, but can be accessed through autobiographical design. Such genuine usage supports reflection-in-action [39] and, as argued by our respondents, allows researchers to draw on intuitions and nuances of experience that escape formal analysis.

Yet, as our results show, there are clearly also situations when autobiographical design is not appropriate. It is not easy to apply when a system already exists to meet users' needs, or if the designer is not directly involved with technology-building. It does not prove that a system can or will be widely adopted. Neither does it establish generalizability, although this is equally true for many qualitative research methods, such as ethnography, case studies, or participatory workshops. In order to see if a design works for others, it can be helpful to conduct broader studies using other methods. We note, however, that our experts described forms of systematic understanding available through self-usage alone, suggesting that broader usability trials should *not* be a requirement for publishing an autobiographical design.

Certainly autobiographical design has always been, and will continue to be, a useful, informal tool in early design *practice*. The question is how to make it a welcome part of HCI design *research*. Like any HCI research method, autobiographical design could certainly be faked; overenthusiasm for a design idea could lead to overreporting or perhaps even making up usage and design usefulness. Clearly, issues such as these motivated respondents' concerns about the ethics of autobiographical design. Yet these concerns demonstrated also how tightly

questions of what we know are tied to questions about how we *should* know and what we view research to be. Here, our respondents varied. Some respondents reported trying to find ways to minimize bias and to establish objective findings. Other respondents were less concerned with objectivity and more interested in the unique experiential dimensions opened through autobiographical practices. These different views potentially tie to different accounts of HCI, as scientific research establishing truths of interaction (typically tied to behavioral science) or as interpretive research revealing alternative perspectives and new possibilities for design (typically tied to design and ethnography) [25]. Yet, as an anonymous reviewer pointed out, autobiographical design also ties to a *crafts* tradition reflected not only in design but also in computer science, which values hands-on tinkering as a way of knowing.

We would argue that the real difference between self-usage as a semi-reliable way to gain some early understanding and self-usage that can be accepted as a reliable HCI research method is some degree of *rigor*. By rigor, **we do not refer to scientific rigor nor to scientific method**, but rather to careful, critical reflection on one's work processes. Greenberg and Buxton argue that, when validating one's work, "At a minimum, authors should critique the design: why things were done, what they learned, expected problems, how it fits in the broader context of both prior art and situated context, what is to be done next, and so on" [20]. This certainly applies to autobiographical design.

In addition, rigor is maintained when both researchers and reviewers are aware of and respect the unique hallmarks of quality of autobiographical design research. Such hallmarks that emerge from our interviews include an extensive period of genuine, intensive use, measured in months or years; surprises in usage that lead researchers to rethink or further develop initial design conceptions; improvements to design driven by specific, documented incidents of use; and careful articulation of the impact of design decisions on experiential qualities of the system in use.

As a practical matter, based on our own experiences as well as Erickson's, we would encourage researchers using autobiographical design to more formally collect information during the course of use in order to support more detailed and accurate analysis of the design process and its consequences. This could include documenting the needs you anticipate having for a design, the needs that the design actually fulfills once you begin using it, the features commonly used and not used, and design changes and the rationale behind them. In some cases, it might be helpful to automatically log design usage to more accurately determine which features are actually being used and how often. The authors particularly found blogs shared by project participants helpful for reflecting in action on experiences with the system.

We recognize that other HCI research methodologies can provide understandings similar to autobiographical design.

For example, ethnographic methods focus on the articulation of cultural practices over long periods of time including reports on the ethnographer's own experiences while culturally immersed. This is similar in some ways to autobiographical design; however, ethnography does not typically include design work or design iteration. Like autobiographical design, designerly techniques such as cultural probes [19] can provide design inspiration and sometimes even experiential understanding. However, autobiographical design includes the actual creation and iteration of a design as part of its methodological process, whereas cultural probes do not. This is not to say that autobiographical design is better than these and other research methods, but that it has its own strengths and properties.

CONCLUSION

Our paper has described autobiographical design as an HCI research method, based on our own usage of the method over several years along with the experiences and opinions of eleven HCI experts whom we interviewed. Many researchers have already found autobiographical design to be useful and valuable as part of their research process—certainly more than we interviewed for this paper. Yet many do not report it or underemphasize it because of fear of rejection or because they feel it is less than 'scientific.' We feel this practice must change. The alternative is that people continue to do autobiographical design but we are not able to learn from or evaluate it, which would not do the HCI community justice. We hope this work will spark further discussions that will bring these views to light. We also hope this work is a useful resource for researchers who would like to do autobiographical design well and reviewers aiming to understand how to evaluate such work.

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