Designing for Personally Meaningful Experiences

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ABSTRACT

At present, many people experience a lack of meaning in their lives, and this "crisis of meaning" is implicated in many of society's ills. HCI has an opportunity to help people cultivate personal meaning through technology. To that end, this paper conceptualizes personal meaning for design in HCI by bringing together theory from several disciplines and presenting findings from a phenomenological interview study. Eighteen interviews were conducted, altogether exploring three different personally meaningful activities: reading the Bible, running an ultramarathon, and painting a self-portrait. Four themes are found to relate to meaningfulness: self construction, central and peripheral practices, focused curiosity, and presence. These suggest ways for designers to afford personally meaningful experiences through their products, chiefly through the principles of Deep Ambiguity and Self Questioning. This work unifies and extends a range of prior HCI work on design values and ethics, paving the way for further work in this domain.

CCS CONCEPTS

• **Human-centered computing → HCI theory, concepts and models**; *Interaction design theory, concepts and paradigms*; Empirical studies in HCI.

KEYWORDS

meaning, values, experience, phenomenology

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1 INTRODUCTION

It has been suggested that we are currently in a "crisis of meaning," as many people in Western society find their lives to be unsatisfactory [39, 53, 55]. This crisis has been connected to a number of social issues, one of which is mental health. Recent research suggests that a lack of personal meaning is a key factor in depression and suicide [45]. Conversely, cultivating personal meaning has been shown to lead to positive well-being [24] and alleviate depression [48].

Technology is sometimes blamed for this crisis of meaning. By and large, technology has tended to optimize for making things easier and more beautiful and for making people more productive and efficient, rather than appealing to any deeper values [31, 43, 63]. But in human–computer interaction (HCI), efforts in ethical design have shown how technology can and should "optimize" for values such as justice, equality, privacy, safety and more [23, 30, 58, 68]. The context of the crisis of meaning suggests that HCI ought to contribute to the development of personal meaning as well.

To be sure, HCI researchers have shown how technology can contribute to happiness and fun [12, 33, 52], and there is a growing movement toward designing for well-being [4]. Prima facie, these aims seem related to personal meaning. Indeed, personal meaning is sometimes mentioned specifically in these works but is left undefined and unexplored. A critical opportunity remains to explicate personal meaning in detail for the design of computing systems that afford personally meaningful experiences. As such, this paper serves to conceptualize personal meaning for HCI and call for further design and research using this concept for the betterment of individual lives and society.

This paper includes a conceptual component, in which theories of personal meaning are discussed, as well as an empirical component, which deepens that conceptualization by showing how personal meaning is experienced. These two components in concert are meant to provide insights for designers of personally meaningful experiences. If technology can be harnessed to help people cultivate personal meaning, as this paper suggests, it could be beneficial even to those who do not suffer from depression yet still experience

a lack of meaning in their lives. Notably, efforts to develop such technology would be consistent with the ACM code of ethics, which sees computing professionals as working toward the public good and human well-being.

The paper proceeds as follows: In section 2, related work on personal meaning is reviewed, drawing on literature from philosophy, psychology and technology design. In brief, *personal meaning is defined as how a person acts to bring their various attributes into coherence, making their life feel more valuable and worth living*. Personal meaning includes aspects such as purpose and connection with others. Next, strategies that have been put forth for cultivating personal meaning are reviewed, again from philosophy, psychology and technology design. It is found that these approaches have largely appealed to personal meaning in a general sense. It is then argued that to better contribute to personally meaningful experiences, HCI should better understand how activities that come to be personally meaningful are experienced in the moment. An empirical, phenomenological study was conducted to understand the themes that characterize technologically-mediated personally meaningful experiences (section 3). These core themes are *self construction, central and peripheral practices, focused curiosity,* and *presence*. To close, these themes are discussed, providing insights for the design of technologies that encourage the cultivation of personal meaning, with the two key principles of *Deep Ambiguity* and *Self Questioning* (section 4).

2 RELATED WORK

What Is Personal Meaning?

People sometimes talk about the "meaning of life," by which roughly two things can be meant: the meaning of biological life in general; and the meaning of one person's life in particular. In this paper, *personal meaning* is used to indicate the latter. Other authors may also refer to this as *meaning in life*, or simply *meaning*.

To begin, we can understand personal meaning to be the sort of meaning that contributes to one's being a person. This is tautological, but it shows the two dimensions of the concept: meaning and person. Broadly speaking, *meaning* refers to coordinating action toward goals [18]. Meaning is thus a property of a system [62]. At the level of human experience, meaning can be described as the way patterns of neural activity "evoke feeling-thinking responses in us" [37] as we live in our environments. *Person*, in turn, is "a word for a human being as a social and psychological being, as a human organism having a sense of its place among others of its kind, a sense of its own history and beliefs about at least some of its attributes" [32]. Persons are both multiplicities and singularities, with each person comprising a single perceptual point of view and multiple personal attributes and social attributes [32]. Personal meaning, then, is how a human acts to make these various attributes more coherent. Personal meaning is what makes one's life feel valuable and worth living. Importantly, it is not an all-or-nothing category; rather, it comes in degrees [39].

Though the question of meaning has been taken up in philosophy for millennia, the concept of *personal* meaning has a more recent significant lineage in psychology. Frankl [21] developed a theory of personal meaning through his experience as a psychologist and prisoner in WWII concentration camps. For Frankl, personal meaning arises from:

Purpose being able to see the accomplishments of your work and the reason behind what you are doing
Love experiencing an intensification of inner life; transcending yourself through the other
Courage choosing your reactions and attitudes to situations; practicing humor

Baumeister [2], building on Frankl's work, has established empirically over the past several decades how personal meaning is a fundamental need for humans. Baumeister has devised a framework in which personal meaning can be described along the dimensions of:

Purpose directing our actions in light of the possibilities, hopes, and expectations of the future
Efficacy viewing ourselves as able to make a difference in the world
Values having a basis for judging what is good or bad, and seeking to view our own actions as good
Self-worth considering ourselves as valuable

Discussions of meaning can be understood as part of the positive psychology movement, which has emerged over the past twenty years. In a recent review, Smith [53] integrates the work of Frankl, Baumeister and others in psychology and philosophy. She writes that personal meaning has four pillars – **belonging**, **purpose**, **storytelling** and **transcendence** – through all of which runs the fifth theme of **love**.

These frameworks emphasize different aspects of being. Frankl and Baumeister emphasize the role of human activity in personal meaning (as purpose), while Smith emphasizes social relations (as belonging, storytelling and transcendence). That said, all of the frameworks share the concept of *purpose*, and they also all refer to some sort of *human connection*.

Personal Meaning in Technology Design

Given that personal meaning is necessary for a healthy life, and seeing as computer technology plays a central role in contemporary life, it seems clear that the intersection of personal meaning and computing should be explored. Indeed, this view goes back at least to Norbert Wiener, an early thinker in information ethics and cybernetics. Wiener distills his view of human flourishing in his great principle for

justice, which recognizes a need for individuals to be free to pursue the aims they find personally meaningful [66].

Still, personal meaning has been scarcely conceptualized in HCI – and the computer and information sciences in general. As we will see below, there has been some work in HCI on how particular aspects of personal meaning could be cultivated through technology, but there has been virtually no comment on personal meaning as such. The shining exception is the work of Walker [63], who developed a theory of personal meaning for application in design.

Walker contrasts personal meaning with self-indulgence and pleasure-seeking, which he sees as characteristic of most design, industry and advertising today. His conceptualization of personal meaning, which does not make reference to the frameworks discussed above, focuses on values that can be manifested or supported through designed objects:

> With or without religious associations, *personal meaning* refers to a wide range of experiences and practices that, collectively, are considered important aspects of human well-being. They include *substantive values* and *matters of ultimate concern* which, together with practical values, encompass our ways of acting in the world, ethical behaviours related to our social interactions and personal inner development. [63]

As he mentions, Walker relates personal meaning to other concerns in human life. For Walker, personal meaning contributes to social responsibility, environmental care and economic issues – in a word, he focuses on how personal meaning is linked to *sustainability*. Indeed, he proposes that personal meaning should be considered a "fourth bottom line" of sustainability (the other three being social, environmental and economic factors): "sustainability has to be relevant and meaningful to the individual person, as well as socially responsible" [63]. So if the prospect of personal meaning might seem solipsistic to some, here is revealed its wider value.

Cultivating Personal Meaning

The conceptualization above allows some inference as to how personal meaning can be cultivated. Happily, this topic has been discussed head-on by researchers in philosophy, psychology and technology design.

Philosophy. As described in the philosophical literature, personal meaning is not a given, but rather something that must be cultivated. Dreyfus and Kelly write that cultivating personal meaning is a matter of building the skill of encountering the sacred in the world [16]. In conceptualizing the sacred, they invoke the Ancient Greek concept of *poiesis*, which can be translated as *craft* or *making*, though it is distinct from *techne* (a root of our words *technology* and *technique*). Poiesis entails both passive and active components: passively, poiesis refers to simply being receptive to that which is given in the world; actively, it involves trained judgment for making distinctions [16]. Landau offers practical advice for cultivating this trained judgment, chiefly in the form of questions a person can ask themselves [39].

These philosophers argue that opportunities for meaning abound, even in seemingly banal or menial situations, and that seizing these opportunities is our responsibility. Strategies for this include practicing gratitude and sensitivity to beauty, letting go of perfectionism, and reflecting on the past [39]. As an example, Dreyfus and Kelly discuss making one's morning coffee. An everyday task, making coffee could easily be delegated to Mr. Coffee or Starbucks – in which case it is devoid of personal meaning. On the other hand, making coffee could be a site for poiesis: If a person takes care to select particular beans, grind them in a certain way, and brew the coffee in a distinct manner, the task has become personally meaningful. Following that, drinking the coffee can be just as meaningful: A person can sit somewhere intentional, drink from a special mug, savor the aroma and color, etc. [16]. Here we can see that the creation of personal meaning is a matter of deciding which distinctions matter to a person, and then making those distinctions:

> When one has learned these skills and cultivated one's environment so that it is precisely suited to them, then one has a ritual rather than a routine, a meaningful celebration of oneself and one's environment rather than a generic and meaningless performance of function. [16]

Relating this to the above conceptualization, practicing poiesis contributes to several aspects of personal meaning, including love and belonging (as it deepens one's relationship to their environment and others), values (as it helps people define what matters to them), and purpose (as it helps guide people toward meaningful futures).

Psychology. In clinical psychology, a key technique that has been used to help people cultivate personal meaning is the Life Review intervention. It was developed several decades ago [6, 41] and has since seen many variations [65]. In Life Review, people are guided through reminiscence of their lives over a number of sessions, each with a theme (e.g., photographs, hands, friendship, desire). The intervention has been shown to help with death preparation, identity development, problem solving and interpersonal bonding [41].

In the beginning, Life Review was predominantly used with elderly people seeking to alleviate depressive symptoms [6]. Nowadays, Life Review is used with many populations, and reviewing memories from one's past is seen as an important process for individual development throughout the life span [47]. For all populations and throughout the decades,

the link between Life Review and personal meaning has been maintained and stressed. Aspects of Life Review said to contribute to personal meaning include learning from adverse experiences, remembering solutions to past problems, and integrating memories into a coherent life story [8, 38].

Relating this to the above conceptualization of personal meaning, Life Review contributes to storytelling, efficacy and perhaps other aspects of personal meaning through helping people make sense of their life experiences, and to the purpose aspect through guiding people into the future.

Technology. Though there have been some theoretical discussions linking technology to personal meaning [9, 20, 66], technology design for the most part has not built on that work [63]. As mentioned above, an exception is the work of Walker [63], who contends that personally meaningful objects have three aspects: high quality, durability and upgradability. Expanding on these aspects, Walker articulates a number of design values for personal meaning (and consequently, as discussed above, sustainability):

- Evolve continuously as technology and tastes change
- Accommodate change in the form of upgradable and replaceable components
- Be maintained, repaired and upgraded locally
- Foster more considered and less distracting use

Centrally, Walker argues that the goal is to give technological objects inherent value *as objects*, "over and above their utilitarian value" [63].

Besides Walker's work, there has been some work addressing technology design for personal meaning, albeit obliquely. Various authors in HCI, for example, have made explicit mention of personal meaning in their writing on how technology can afford: personal reflection and story; life relevance and ambiguity; and Slowness. However, the link between these concepts and personal meaning has been left unspecified. To be sure, these design approaches are related to others, and more work has been done than will be mentioned here. Due to space constraints, this paper focuses only on work that explicitly references personal meaning; for this, a literature search was conducted in the ACM Digital Library and related databases, and citations were traced forward and backward.

It is notable that, whereas Walker discusses designing for personal meaning as such, this other work relates only to (what are implied to be) particular aspects of personal meaning and lacks an overarching theoretical strategy. Thus, one aim of this paper is to connect these efforts together and clarify their contribution to an overarching rubric of designing for personally meaningful experiences. To that end, each of these will be discussed in turn.

To begin with design encouraging personal reflection and story, examples include AnyType [13], a system allowing people to create letterforms by photographing objects in their environment; GoSlow [10], a smartphone app design with various features to encourage introspection; and Photobox [44], a wooden chest equipped with a photo printer that encourages reflection on the past. Lastly, design practices for helping children engage in Story-Making have been discussed, seeing personal reflection as related to story [46].

Related to this, there has been some design work on life-relevant learning [11], which is said to contribute to personal meaning in children by allowing them to choose their own approach to exploring shared topics in educational settings [1]. Outside the specific paradigm of life-relevant learning, there have been efforts to integrate design into people's lives through location awareness. For example, Noising Around enabled students to use mobile devices for measuring and analyzing sound levels around their schools [69]; and Ambient Wood achieved something similar in woodland settings [49]. Such approaches respond to the problem that much technology is designed in highly structured ways, giving users little flexibility for exploring their own curiosity [69].

Next, authors have highlighted how ambiguity in design can afford life relevance by allowing users to understand objects in personal and contextualized ways that may not have been predictable by the designer [26, 51]. An example of this is Drift Table [27], which does not define its own purpose and thus enjoins users to complete the object by interacting with it. Relatedly, there has been work on designing for enchantment, such that users can be surprised by information and objects in their environment, even mundane ones, and have rich, personally meaningful experiences thereby [42].

Lastly, the Slow Technology movement has been tied to personal meaning since Hallnäs and Redström's seminal article [31]. Slow design affords understanding as well as self-reflection by stimulating people to attend more to the personally meaningful aspects of an interaction than to the less meaningful parts [29]. A theoretical framework for slow design has been presented, which includes the principles of Reveal, Expand, Reflect, Engage, Participate and Evolve, all of which are centered around Ritual. Those principles lead to product attachment, through Memories, Time, Self Expression, Group Affiliation, Keeping User Involved and Function [29]. Examples of designs in this connection include GoSlow and Photobox, discussed above.

Relating all this to the above conceptualization of personal meaning, it is clear that prior work in HCI has contributed to efficacy, values, belonging, storytelling and purpose.

3 A STUDY OF PERSONALLY MEANINGFUL EXPERIENCES

The literature provides an understanding of what personal meaning is *in general* – that is, in terms of ahistorical concepts rather than feelings and experiences at any particular

moment. Indeed, not much is known about meaningful experiences in the moment of their being experienced. This is a crucial lacuna; as is evident from the literature, personal meaning is *experiential*; it builds up over time from particular experiences. As scholars have argued, "we need to move away from the idea that we can design for the immediate quality of an experience, towards the understanding of what constitutes experience in terms of our lives and culture" [22]. If design for personal meaning is to advance, an understanding of information experience [5, 28] in personally meaningful activities must be built. With that understanding, technology can be designed that affords such experiences, from which deeper personal meaning will bubble up.

Thus, the present study responds to the following research question: *How do people experience technology in personally meaningful activities?* To answer that question,

> we have to use a different kind of language. Rather than relying primarily on facts, analysis and information [...] we need to draw equally on the language of emotion, relationships, integration and composition. This involves intuition, subjectivity and the lived experience. [64]

For this reason, the present study is different in nature from much empirical research in HCI. While typical HCI user research examines how people use particular technologies, there is also space – and necessity – for more basic research in the field. In the context of the present discussion, the field of design for personal meaning can benefit from research on people's personally meaningful experiences as they *cope* [57] in today's *onlife* [19] world. This implies an ethnomethodological approach, examining how technology is a part of human life "in the wild" and with a respect for the texture of human life [7, 25]. Such research has provided design-relevant insights in numerous contexts [57] in ways that go beyond bullet-pointed lists of design implications [15], and the present work contributes in a similar way to the question of personal meaning.

This study is also in the vein of Rosner's *critical fabulations* [50], a mode of inquiry that seeks to "rework how things that we design come into being and what they do in the world." Rosner details her journey in moving from traditional design to a mode of critical fabulation: "I shifted my questions of confirmation (Can digital tools enhance practices of storytelling while making?) toward questions of substance (How and what underlie people's value systems around making?)" [50]. In the same spirit, the present study explores what underlies people's personally meaningful experiences, contending that the understanding gained through such work can later be used as the basis for design. This is a stepwise, context-sensitive and mindful approach to design.

Methods

The present study took the form of 18 semi-structured, phenomenological interviews with individuals, centered around each participant's recent experience with a personally meaningful activity. These activities were technology-mediated to various degrees and in various ways; still, the focus of the interview was not on the particular technology used, but rather on the qualitative nature of the whole experience. There were three groups of participants, corresponding to three types of activity: reading the Bible; running a 100-mile footrace, and painting a self-portrait. The methods used in this study were approved by the institutional review board where this work was conducted.

Phenomenology, the study of lived experience, is an appropriate research paradigm for addressing the present research question. There are many approaches to conducting phenomenological research in HCI [14, 22, 59, 67]. This study used interpretative phenomenological analysis (IPA), a well-established empirical methodology designed for understanding particular experiences [54]. IPA uses smaller groups of participants (typically fewer than 10) than other forms of qualitative research; it seeks to go deep but narrow. IPA provides holistic, idiographic insights that may not be observed with other methodologies, and it has been used fruitfully in HCI [40] and other realms of sociotechnical design [35, 60]. IPA seeks to value each individual's experience while also drawing out characteristics that are shared across participants. IPA studies are guided by research questions but not pre-established theories; through inductive and abductive reasoning, a theory (typically descriptive) is devised from the empirical material in light of the research question. This theory generally takes the form of a number of themes that are explicated and linked together by narrative.

Recruitment varied by group:

- The first group, Bible readers, was comprised of 6 individuals from a large, East Coast, U.S. city who identified as Catholic. They were recruited through an advertisement in a weekly church bulletin and with the help of the parish priest. In this group, there were 2 men and 4 women, ranging in age from their mid-20s to 60s. These participants were given pseudonyms inspired by herbs. These interviews were conducted in person.
- The second group, ultra-distance runners, was comprised of 5 individuals who participated in a 100-mile footrace in the Midwestern United States. They were recruited through a pre-race email message from the race director. In this group, there were 3 men and 2 women, ranging in age from their 20s to 50s. These participants were given pseudonyms inspired by the Trojan War. These interviews were conducted via Skype.

- The third group, visual artists, was comprised of 7 individuals from a large, East Coast, U.S. city. They were recruited through convenience and snowball sampling, chiefly by contacting artists via email whose contact information was found through an open web search for local artists. In this group, there were 2 men and 5 women, ranging in age from 18 to 65. These participants elected to use their real (first) names. These interviews were conducted in person.

In this study, empirical material was gathered through semi-structured interviews with individuals. Each interview followed a similar protocol, centering on a detailed recounting of the participant's most recent experience engaging in the activity under study. The interviews with the first group centered around the last time the individual read the Bible (conducted in 2015); those in the second group centered around the last 100-mile race the individual took part in (conducted in 2016); those in the third group centered around the creation of a self-portrait, which was part of a larger study (conducted in 2017). The interview probed for the participant's actions and feelings throughout that particular experience, as well as decisions regarding technology use (which technologies and why). In all cases, the interview also touched on more general matters of technology use and non-use regarding the Bible, running, and art, respectively. Each interview lasted 30–90 minutes.

To begin the analysis, each interview was first transcribed and then individually open-coded for emergent themes that seemed salient with respect to the research question at hand. Next, each participant's experience was considered in light of the others in the same group. Pursuant to IPA, the analysis iterated between individual and group in order to refine the codes and uncover what was shared and unique about each participant's experience. Generally, IPA studies involve only one group of participants. This study, however, had three groups; thus the analysis had an extra stage of considering what was unique to and shared across the three groups. In the end, four themes relating to personal meaning were found to be shared among the participants of all three groups, and these will be presented in the next section.

A brief note on how this work developed. This study unfolded over the past several years as the researcher was drawn to study technology use and non-use in personally meaningful experiences. The Bible readers were the first group studied, under the assumption that religious experiences are highly personally meaningful. It soon became clear that, of course, other sorts of experiences could also be personally meaningful. This led to research with athletes and then artists. At that point, the intention shifted to understanding the breadth of personally meaningful activities in human life; that shift motivated the literature review that formed the conceptual portion of this paper.

Thus, the selection of the activities examined in this study was not particularly systematic, but rather they emerged through a long-term path of inquiry. In phenomenological (holistic, experience-based) design research, this should not be considered a detriment. As Walker writes:

> The practice of design [is] unapologetically unsystematic. Systematic approaches are deliberately and rationally constrained by the frame of reference of the investigator or designer. By contrast, opening up one's view to many and varied experiences and encounters in galleries, museums, libraries and, most importantly, in the world itself 'allows in' the unexpected and the serendipitous, as well as outlooks and frames of reference different from one's own. [64]

The aim of the study was to understand technology in these personally meaningful experiences in a holistic way. The three activities selected did indeed result in a serendipitous range. Though each is personally meaningful, the activities are distinct, particularly across the dimension of bodily activity: Bible reading is sedentary, while ultrarunning requires protracted physical exertion, and self-portraiture is somewhere in between, requiring particular physical skill.

Findings

The findings from this study take the form of themes that characterize the participants' experiences in technologically-mediated personally meaningful activities.

Self Construction. First, in all cases, the activities were experienced as part of the person's self. Put differently, doing these activities was inextricable from who the person is. In most cases, the activity was not part of the person's self or identity for their whole life; rather, it is something that they discovered at some point and cultivated as a personally meaningful activity to the extent that it now forms part of their self-concept. Each experience of the activity, then, is a stepping stone in the development of, and also a reaffirmation of, their self. Helen's account illustrates this poignantly:

> I started running about 7 years ago, just to get out of the house, really. I had two little children, and I was pushing them in the stroller and just trying to get some space in my head to think. I always noticed I was pushing them as fast as I could, and then I just started gradually running. It just grew. You think you can't do it, and you start running from one sign to the next, and then you enter a race.

Helen, like the other runners, described her trajectory in terms of taking on progressively greater challenges, and she sees her ability to overcome challenges in running as a microcosm of her ability to overcome challenges in her life in general. Similarly, the Bible readers conceptualized their practice as "a journey." The participants described how their faith waned and waxed through their lives, and how their Bible reading related to their faith journey. For the artists, this journey was a matter of developing their personal style through deliberate practice and experimentation.

Central and Peripheral Practices. In this study, the experiences involved a central practice along with a number of peripheral ones that supported or enhanced it, generally involving multiple forms of technology that fit together in an experiential mesh.

The Bible readers, for example, not only read the Bible, but also read commentaries and meditations on particular passages and also conducted searches for additional information (e.g., historical context). The runners not only ran races and training runs, but also read race reports and magazines, engaged in online discussions, and researched new products. The artists not only created particular artworks (and indeed, generally several at a time), but also doodled, read widely and monitored social media for inspiration.

These peripheral practices come to bear on the central practice, sometimes in unexpected ways. For example, during the months when Justin was working on his self-portrait, a photographer visited his studio for a photoshoot, and soon after he went on a hiking trip to Colorado to experience the full solar eclipse of August 2017. These events unexpectedly affected his self-portrait. As he explained:

> It took me a while since our initial meeting to formulate what I wanted to do. I sat on it for a while, just thinking. I would say months and months of thought went into the initial concept of it. The length of time from concept to finish even then was a few months. [...] I took this trip to Colorado, and then these photoshoots, seemed to motivate me to finish it while I had this idea of who I am and what I'm trying to do, if that makes any sense. That pushed it over the edge for me to really finish it, because it was very fresh, my point of view of myself was so fresh, and the artwork showed. Like it went from slow concept build to the attempts and once those photoshoots happened and this trip I took that seemed to be very important to me, as soon as I got back it was done within that week. [...] It gave me the confidence as an artist and to achieve my goal. I had a goal to climb that mountain, and I achieved it. That gave me the confidence to trust my instincts on it and [...] that it was gonna be fine and that I was gonna be satisfied with it. [...] And the perception of it, I was concerned about the perception of how other people would look at it and see me as, but once that trip happened, that went away.

This demonstrates that, though these experiences can be analytically isolated, they are always playing out in the life-world, and they can be enriched, challenged, replaced, etc., by other goings-on. To speak of replacement, Emily's account provides a good example; she began her self-portrait as a photographic collage, but as the months passed she switched to oil painting. Her painting was restarted many times, and she stopped to work on other paintings throughout the process as inspiration struck her.

Focused Curiosity. All the participants experienced their activities as being guided by curiosity. This was a *focused* curiosity, wherein the participants let themselves wander with respect to a particular topic or question. Practically speaking, this involved regularly monitoring certain information sources, ranging from Facebook and Pinterest to daily devotional texts, and seeking further information on topics that sparked the person's interest. Oftentimes this was a matter of being open to engaging with the information that was already tacit in the person's life. The participants conceptualized this in various ways; for instance, the artists talked about this as finding inspiration, whereas the Bible readers talked about it as being guided by God. To quote Willow:

> I always think the Lord leads you, because you'll read something, and He leads you to that, and then you start investigating, and you read more, and you go deeper [...] and it takes you to another scripture. [...] It's like a little journey.

Following one's curiosity in these personally meaningful activities led to a personal progression which was, generally, transparent to the person. As mentioned above, the Bible readers described their engagement with the Bible as central to their journey in life. All the participants in the Bible group were born and raised Catholic, but they went through periods of little interest in religion, typically beginning in the teenage years and lasting for a decade. In their case, their journey seems to be a matter of blooming faith; within this, participants cultivated an appreciation for the ritual, a deeper relationship with God, and inner peace. For the runners, this progression took the form of continually growing challenges. As a runner grows in their athletic career, they pursue longer distances, faster times, and/or new settings. Nestor:

> I definitely want to continue reaching higher and higher. There is a quote that really resonated with me, and I've got it posted on my wall at

> home. It's from that book *Born to Run*, and there's a section in it that says, "Why the hell would you run a 100 mile race?" and the guy's response was, "Why does anybody ever climb Everest? It's because it's there." So the quote on my wall is "Because it's there." I'm here right now. So what else can my body do? What's actually possible? How far can I push myself? What are my actual limits? Continuing to find those and continuing to improve. What am I absolutely capable of?

As for the artists, their progression entailed developing and exploring their personal style, gaining skill with their chosen media, and trying new techniques and materials. For the professional artists, an important part of their progression was becoming financially independent as artists.

Of course, this progression is not a journey in the sense of having had a destination predetermined from the outset. Rather, it is something that accumulates over time and can only be seen in hindsight; as Steve Jobs once said in a famous speech, "You can't connect the dots looking forward; you can only connect them looking backwards."

Presence. Last, for all of the participants, presence was an essential aspect of their personally meaningful experiences. In fact, they made choices regarding technology that encouraged them or helped them to be more present in the experience. For example, the Bible readers described intentionally using print versions of the Bible when their goal was meditation and prayer, whereas digital versions were better suited to searching. Jasmine said:

> When I'm sitting there with the hard copy and it's in my private time with the Lord, I feel much more relaxed. Much more like we're there together. When I'm on this thing [gesturing to her phone], it's like, "Okay, be quick." I get distracted easily. If I'm on the computer at work, say, and we're talking, and I say, "Wait, wait, let me look that up." But then, "Okay, wait, I gotta get this," and, "Oh, yeah, can I help you?" When I'm there with the hard Bible [...] it's just me and Him.

The runners likewise made conscious use of technology to enhance their running experiences with respect to their goals. There are any number of gadgets on the market for runners' self-tracking of heart rate, cadence, speed, distance, altitude, etc., and for listening to music or other programming, all of which modulate the running experience. How the various gadgets constrain or afford presence seems, to some extent, to be personal. For instance, Ajax said that any technology was a distraction and he prefers to "run by feel," whereas Nestor and Odysseus found that using a heart rate monitor helped them stay attuned to their body. Both Nestor and Odysseus contrasted heart rate monitoring with GPS tracking, which they found to be a distraction. As Odysseus said:

> I don't find a GPS to be helpful because I'm much more in tune with how I feel. If I had a GPS and I start paying attention to my GPS splits, I find it much harder to maintain an appropriate pace and much easier to overdo it, because I want to hit that 8-minute mile here and maintain it when my body is telling me, "Don't do that."

As for the artists, they seemed to choose materials and work situations that helped them be more focused in their art-making. In some cases they carved out time from their daily schedules in order to make art, and they did so in places where they wouldn't be interrupted. Again, these decisions are personal. Brianna, for instance, found that she was most productive in art-making late at night in her home studio, where and when she wouldn't be bothered by other people or be distracted by other obligations later in the day. Emily described her artistic practice as, by choice, "very slow and meditative." For her and the other participants from all three groups, the personally meaningful activity was seen as a break from the bustle of daily life.

4 DISCUSSION

Understanding and helping people develop personal meaning is becoming a critical issue for HCI, as our society is beginning to see the effects of technologies that ignore the human need for meaning. To give one example, [61] suggest that some social media platforms readily afford a sort of browsing that undermines well-being. To help us overcome this crisis of meaning, technology designers have an opportunity – perhaps even an obligation – to help people discover and build personal meaning. Thus, the main contribution of this paper is to shine a light on this topic by extending and bringing together the literature and presenting insights for designing for personally meaningful experiences.

Synthesizing and Building on the Literature

As discussed, HCI has already made efforts in this direction, but they have been rather ad hoc, not relating to an overarching theory or connecting to the literature on personal meaning in other fields.

To that end, an initial point for discussion is to show how prior, disconnected efforts in HCI fit together under the rubric of personal meaning. In this paper, personal meaning has been defined as how a person acts to bring their various attributes into coherence, making their life feel more valuable and worth living. In the literature, various frameworks for discussing personal meaning have been put forth, all of which include the concept of *purpose* and refer to *human connections* in some form. As it happens, work on cultivating

personal meaning in philosophy has tended to focus on purpose, while that in psychology has focused on connections. Prior work in HCI has related to both:

- With respect to *purpose*, philosophers have argued that finding meaning is in part a matter of building the skill of making distinctions that matter [16, 39]. Related work in HCI has focused on designing for life relevance, ambiguity and Slowness [11, 26, 31]. Some discernment is necessary for people to see what is relevant to them and to find meaning in ambiguous designs, and taking a Slow approach can aid this process.
- With respect to *human connections*, psychologists have developed Life Review [6, 41]. Related work in HCI has focused on designing for personal reflection and story [44, 51]. To be sure, looking backward can be a step in going forward; hence reflection and story can also help clarify one's sense of purpose.

This paper has argued that, to deepen these efforts, a better understanding of the *experiential quality* of personally meaningful activities – not in general, but rather in the moment of their happening – is needed. To to that end, a phenomenological study was conducted. The resulting themes of *self construction, central and peripheral practice, curiosity* and *presence* provide a locus for developing technologies that encourage the cultivation of meaning.

Each of these themes has been the subject of some prior discussion in HCI and related fields:

(1) Regarding *self construction*, it has long been argued in philosophy that the boundaries of personhood swell to include technologies in use [34, 36], and more recently it has been argued that a person's information partly constitutes that person [3, 17]. So the information a person creates and the information technology a person uses are all part of that person. The findings from the present study connect those arguments to the issue of personal meaning: Personally meaningful activities interface with a person's sense of self.
(2) Next, to speak of *central and peripheral practices*, it is clear that technologies do not stand alone; of course, this has been discussed in sociotechnical research [56, 57]. The present study emphasizes that technologies do not simply interact socially but also experientially; they may be adopted, adapted, abandoned, etc., pursuant to an overarching strategy of personal meaning, and to the extent that they are used unreflectively they may not contribute to personal meaning.
(3) Next, regarding *focused curiosity*, we can see that personal meaning develops as a person is allowed to follow their own interests and make sense of their journey later on, which is a balance of openness and guidance.
(4) Lastly, the theme of *presence* shows the importance of investing oneself in the activity, rather than stretching oneself simultaneously across several activities, for that experience to contribute to personal meaning.

Together, these themes reveal the in-the-moment dimension of the development of personal meaning. As such, new insights for design may be found in these themes, as well as in considering their intersections.

Designing for Personally Meaningful Experiences

The findings from this study show how personally meaningful experiences entail *central and peripheral practices* which are negotiated along a path of *focused curiosity*. This insight leads to the first principle of designing for personally meaningful experiences:

1. Deep Ambiguity. Designs should allow and invite people to make distinctions (e.g., settings, options, use patterns) that matter to them, considering both the object itself and other objects that can be used with it. This involves both helping people to discover what distinctions are possible and also to decide which ones are important to them personally. This could be a guided process, showing what settings or options exist in a system and encouraging people to select some. Under this principle, designs should invite multiple ways of being used and multiple ways of being incorporated into one's life – as well as change over time. Put differently, this is *designing for ritual*, rather than merely routine.

Prior work on designing for ambiguity has shown how people can discover and invent uses for "ambiguous" objects [26]. The principle of Deep Ambiguity recognizes that the connections *among objects* in a person's life should also be ambiguous. The way a person navigates this ambiguity could also be reflected back to them through feedback, thus informing their sense of self and purpose.

Deep Ambiguity brings together the themes of *focused curiosity* and *central and peripheral practices*. The intersection of the other two themes, *self construction* and *presence*, reveals a second principle for design:

2. Self Questioning. Designs should put a person's self into question. This is because, for a technology to be (more) personally meaningful, it must (better) relate to a person's sense of self as a whole person. Designs should show people the rituals and routines that they are following, allowing them to learn about themselves and the things that they do – and also to see that they are making choices that inflect who they are. Such designs may help people better understand themselves as unfolding processes. This may involve affordances for a person to make sense of their life journey (crucially, *as a journey* and not just as a random smattering of activities).

To illustrate how these principles can be implemented, it is worth revisiting some of the designs mentioned in section 2: Drift Table [27], Photobox [44], and GoSlow [10]. As mentioned, these designs were meant to contribute to personal meaning, at least obliquely, but they did so primarily by pursuing different concepts under the umbrella of personal meaning – ludic engagement, reflection and Slowness – and the precise connection between these concepts and personal meaning has been left only implied. How might these designs be modified based on what this paper shows?

Drift Table was designed primarily for ludic engagement – that is, playfulness and fun [27]. These, of course, are worthwhile design values, but fun alone may not be sufficient for personal meaning to arise. Even so, Drift Table has many features that are also apt for personal meaning, including curiosity, de-emphasizing external goals, ambiguity, being enmeshed with everyday activities. Designed more wholly for personal meaning, how might Drift Table be different? Following the principle of Deep Ambiguity, other objects could be given out with the Drift Table, such as items (similarly ambiguous) of particular masses that could be used along with the table. Following the principle of Self Questioning, the table might respond differently to different people, and show that it is doing so.

Photobox was designed primarily for reflection [44]. It already incorporates many aspects of personal meaning, including focused curiosity and presence. How might the Photobox be redesigned? For Deep Ambiguity, the system could select linked or thematic photos each month rather than random ones, inviting people to see connections. For Self Questioning, a redesign could accommodate multiple Flickr accounts. What if the box knew who was engaging with it, and printed a photo from that person's account, rather than only from one person's account even in a mixed household?

Lastly, GoSlow was designed primarily for Slowness [10]. The app encourages people to build personal meaning primarily through self construction and presence. Following Deep Ambiguity, a redesign might have the app respond to other things going on in a person's life, such as holidays and calendar appointments. A redesign might further engage Self Questioning by directly asking questions or including activities that go beyond this moment to encourage broader reflection on one's life. Perhaps new activities could be unlocked as one spends more time with the app.

Further Research

In addition to providing insights for design, the findings of this study spark questions for further research. This is a key quality of phemomenology, which "is primarily a philosophic *method for questioning*, not a method for answering or discovering or drawing determinate conclusions" [59].

First, future research should consider whether all systems should aspire to be personally meaningful – and if not, which should. An assumption of this paper is the more personal meaning, the better; consequently, the more Deep Ambiguity and Self Questioning, the better. However, these principles may be inappropriate in certain contexts, such as, perhaps, government or business. On one hand, there may be benefits if renewing a license or filing taxes were more personally meaningful; on the other, throwing one's self into question in these circumstances may have undesirable consequences.

Other sorts of personally meaningful activities should also be researched in a continued attempt to discern what it is about these activities that makes them personally meaningful. Such research could take a closer look at particular technologies within these activities, perhaps assessing the comparative meaningfulness of different alternatives.

Additionally, further research could explore how technology design can appeal to aspects of personal meaning that have not yet been approached in HCI. For example, designers have looked at features such as ambiguity and reflection, but not courage or transcendence. How could design contribute to those aspects of personal meaning?

5 CONCLUSION

In *Man's Search for Meaning*, Frankl [21] wrote, "Those who have a 'why' to live, can bear with almost any 'how.'" Having and cultivating personal meaning is part of one's "why." Indeed, personal meaning has been described as a human need. As mentioned in the introduction, a paucity of personal meaning is one of the ills of modern society. Some suggest that technology has abetted this situation; and yet prior efforts in HCI have been shown to relate to the overarching aim of helping people develop personal meaning. This work makes it clear that technology design can play a helpful role in the current crisis of meaning. With an intentional approach, these efforts can be redoubled. As this paper has shown, principles of such an approach include *Deep Ambiguity*, inviting people to make distinctions that matter to them and create rituals in their lives, and *Self Questioning*, inviting people to consider how their actions contribute to who they are as selves. Certainly other strategies remain to be uncovered as HCI continues to move into designing for personal meaning.

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