

# The Fundamental Uncertainties of Mothering: Finding Ways to Honor Endurance, Struggle, and Contradiction

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Present day ideals of good parenting are socio-technical constructs formed at the intersection of medical best practices, cultural norms, and technical innovation. These ideals take shape in relation to the fundamental uncertainty that parents/mothers face, an uncertainty that comes from not knowing how to do what is best for one's children, families, and selves. The growing body of parent-focused smart devices and data-tracking platforms emerging from this intersection frame the responsible parent as one who evaluates, analyzes, and mitigates data-defined risks for their children and family. As these devices and platforms proliferate, whether from respected medical institutions or commercial interests, they place new demands on families and add an implicit emphasis on how humans (often mothers) can be augmented and improved by data-rich technology. This is expressed both in the actions they support (e.g., breastfeeding, monitoring food intake), as well as in the emotions they render marginal (e.g., rage, struggle, loss, and regret). In this article, we turn away from optimization and self-improvement narratives to attend to our own felt experiences as mothers and designers. Through an embodied practice of creating Design Memoirs, we speak directly to the HCI community from our position as both users and subjects of optimized parenting tools. Our goal in this work is to bring nuance to a domain that is often rendered in simplistic terms or frames mothers as figures who could endlessly do more for the sake of their families. Our Design Memoirs emphasize the conflicting and often negative emotions we experienced while navigating these tools and medical systems. They depict our feelings of being at once powerful and powerless, expressing rage and love simultaneously, and struggling between expressing pride and humility. The Design Memoirs serve us in advocating that designers should use caution when considering a problem/solution focus to the experiences of parents. We conclude by reflecting on how our shared practice of making memoirs, as well as other approaches within feminist and queer theory, suggest strategies that trouble these optimization and improvement narratives. Overall, we present a case for designing for mothers who feel like they are just making do or falling short, in order to provide relief from the anxiety of constantly seeking improvement.

CCS Concepts: • Human-centered computing → HCI design and evaluation methods;

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## 1 INTRODUCTION

“My son’s birth brought with it an exaggerated sense of both my own power and my own powerlessness. I found myself bargaining with fate so frequently that my husband and I made a game of it, asking each other what disease we would give our child for prevention against another—a parody of the impossible decisions of parenthood.” [Biss 2015]

To transition into the role of a parent, or even a hopeful or expectant parent, is to confront a deep sense of uncertainty. It is a kind of uncertainty that provokes widespread doubt about the smallest functioning of our cells to the existential worry that confronts lives, deaths, and livelihoods. We live in the constant fear of the chemicals in our paint and the potential incorrect placement of pillows and blankets, all while constantly dreading that our child might suddenly die without warning and of unknown cause. This mixture of fear and the desire to protect, places parents in a position of making the kind of “impossible decisions” described by Eula Biss above. The decisions are impossible because of the inherent and fundamental uncertainty of the situation and the limits to our knowledge and ability. This experience of fundamental uncertainty also appears in many Euro-American parenting memoirs, diary entries, and blog posts, where the uncertainties of knowledge practices “increase as fast as certainties are established: each horizon exposes more terrain” [Strathern 2011, p45]. At some point for parents, the high-stakes decision making reaches a breaking point, forcing us to switch between the rigor of protecting and the acceptance of our own inabilities. The true pain at times is because we know that there is always something we could be doing better, but at a certain point we have to confront and accept our physical and mental limitations.

This article describes three deeply personal accounts of becoming and being mothers to trouble the current trend of data collection, sense-making, and optimization in the face of fundamental uncertainty. In fact, we describe how our experiences have led us to call design research’s frequent narratives of improvement into question. We suggest that some difficult experiences are not problems in need of improvement, so much as fundamental experiences to be witnessed. The very language and rhetoric of improvement necessitates design practices that are biased towards action, improvement, proof, and results. What might it look like for designers to instead, cultivate practices of attentive listening and witnessing rather than rushing to the lure of improvement? And how could undertaking such approaches bring new insights and strategies to design practitioners?

This article encourages designers to refrain from (immediately or solely) using novel methods of tracking and sense-making to alleviate the magnitude of anxiety confronting uncertainty. We start by showing how such trends have historical underpinnings and can cause harm in their reduction of struggles to matters of mathematics and probability. We describe current trends in self-tracking and baby-tracking as the logical progression of a long history of folk theories about what constitutes good parenting, all of which address questions of the unknown with promises of certainty. We then turn to the fields of narrative medicine, memoir, and fine art practice to complicate and envision other ways of engaging and addressing the uncertainty of parents, suggesting that witnessing these experiences (e.g., pregnancy, birth) can help temper, or simply provide fullness to

the reductions characterizing most improvement narratives. The authors then use an approach of creating Design Memoirs [Devendorf et al. 2020] to interrogate and surface their experiences through the practices of design. The outcomes of this exploration highlight our own experiences of parenting as deeply contradictory and uncertain in and of themselves: characterized as much by rage, regret, and exhaustion as love, joy, and laughter. Most importantly, our explorations allow us to feel as though we can speak back to narratives of optimization to say instead that our human form is irreducible, is necessarily uncertain, and may simply need to be good enough as is.

We conclude with a discussion reflecting back on the practices of designing for women and uncertainty more broadly within HCI. How are we to make sense of what we learned in our personal experiences and how can we meaningfully share them with the community? We describe how we considered the experiences evidenced in our memoirs as wicked problems to prompt others to explore such topics with care, although we ultimately found that framing to be problematic. Instead, we found inspiration in queer/feminist “low” theory that advocates for embracing failure as a mode to question disciplinary and/or capitalist orientations towards improvement. This framing helped us think through the implications of turning away from improvement—when to reject the drive to do and know more and, instead, use design to dwell in our own frailties.

We are mindful of many things in this endeavor, and likely oblivious to countless more. We accept and acknowledge that we are enormously privileged, as white, cis-gender women with academic jobs, living with financial security in the relative comfort of the western world. We are also more and less privileged individually in different ways. Furthermore, we present our experiences in parenting as some among many, acknowledging that the category of “mother” or “parent” is not contingent on having been pregnant or given birth. We recognize, with some unease, the professional risk in presenting our subjective and intimate work for peer-review by our community. That said, our approach has been to establish trust and agreement to protect our mental health, and to go about the construction of something and then reflect, engage, and examine together. Through this process we seek to place this work within a broader social and political context involving our own research field, the medical establishment, issues of caregiving, and our own lived and felt bodily experiences.

## 2 QUANTIFICATION AND THE UNCERTAINTY OF PARENTING

There is a long history of best practices for parents emerging along the fringes of scientific and medical practices that illuminate how “good parenting” is a notion that changes with time and technology. Published by doctors, midwives, and churches, these advice books for mothers (and more recently parents) offer a history of cultural and societal values at the intersection of philosophy, psychology, and medicine. Such books, with colorful titles like “Advice to a Wife” reflect dramatic shifts in the socio-technical construction of what is deemed to be good parenting. The advice for cold baths in the 1800s was replaced with suggestions such as “Handle the baby as little as possible. Turn it occasionally from side to side, feed it, change it, keep it warm, and let it alone; crying is absolutely essential to the development of good strong lungs. A baby should cry vigorously several times each day” [Sadler and Sadler 1916]. As the following Atlantic magazine article on the history of parenting advice notes:

These books were written well into the scientific age, by men who claimed to possess scientifically collected knowledge. It shows how deeply bewildered and susceptible parents were as the world changed around them, and how tightly the old wives’ tales still gripped people’s minds. Who wanted to be the first to contradict them at the peril of their child? [Oneill 2013]

As much as technologies from X-rays to brain scans have served to underlie changes in what is “good” for children, folk theories and cultural beliefs still pervade notions of what someone “ought” to do, feel, and exhibit as a parent. Furthermore, because child mortality rates in the Western world have dramatically decreased over the past centuries, the concerns facing Western parents have expanded from issues of life or death to also now include academic and physical achievement. As such, a much broader spectrum of cultural norms and values are considered in the judgement of good parents. Seen through the lens of the ebbs and flows of parenting trends and a kind of emotional vulnerability easily leveraged by marketers, present day appeals to good parenting as a practice of collecting data, tracking, and calculating risk can be rendered as just one among many approaches designed to both help parents and sell products. Of course, the counting and measuring of human life has a long history dating as far back as the 1500s, where “body counts, activity trackers, and personal ledgers shape what it means to be a person, body or citizen in Western culture” [Wernimont 2018, p15]. While self-tracking might not be new, the rhetoric of contemporary consumer technologies has shifted in this now money-making domain, which focuses on self-knowledge, self-actualization, and becoming, to quote Jorgen Nordin of Jawbone, a “better version of yourself” [Lewington 2015].

## 2.1 The Rise of Data-Driven Parenting

Suggestions that parents appeal to data to mitigate, navigate, and control uncertainty reflect broader positivist trends in data-driven decision making [Mandinach 2012] that call people to question their assumptions and to seek truth and meaning within data. This data-driven approach to pregnancy and child-rearing is prevalent in current best-selling advice books such as those by author and economist Emily Oster (e.g., *Cribsheet: A Data-Driven Guide to Better, More Relaxed Parenting* [Oster 2019]). Where in years past people sought the expertise of figures like “Dr. Sears” and “Dr. Spock,” here data interpreted by an economist is used to “focus on how the world is,” as opposed to parenting advice that “is focused on how the world should be in someone’s mind” [Widdicombe 2019]. The books offer advice on issues such as alcohol consumption during pregnancy, breastfeeding, and toilet training based on analysis of significant research studies. While the methodology used in these popular Anglo-American books is disputed by standard entities such as the American College of Obstetricians and Gynecologists, and the American Academy of Pediatrics Section on Breastfeeding, they nonetheless exert a strong, data-driven persuasive power about the collective “right way” to do things, which is stronger in force than prior narratives about what one “ought to do.” This bleeds into technologies marketed to mothers and families with advertising taglines such as “There is feeling and there is knowing” [Bloomlife 2019].

## 2.2 Data as a Way to Overcome Human Frailty

We in no way seek to judge those who use such products and find the practices they offer deeply comforting. This just was not the case in our personal experiences and perceptions and, thus, shapes our analysis. As we analyzed and reviewed these products and related works, we felt that data-driven parenting narratives raise a kind of “broken body thinking” [Forlano 2017], where technology comes to the aid of women to make them more knowledgeable and caring than they might naturally be capable of. In this framing, the uncertainty facing parents is not fundamental and can be treated, so to speak, through technological intervention that corrects that parent’s deficiencies. These narratives are common in technology, as Wajcman writes in *TechnoFeminism*: “Promises of emancipation from the frailties and failings of mortal flesh have reached a new crescendo in the cyberspace age” [Wajcman 2004]. So, even while technologies may deliver valuable innovative information and treatment to unborn children and parents, they also implicitly

sets up the conditions for the human to be seen as less than capable and for an unborn child to be surveilled and forced to participate in a digital society in utero [Barassi 2017].

It is this perceived sense of being somewhat diminished or deficient without using technological support tools that frames our work. There is much at stake here as this self-improvement imperative is wrapped up in a commercial framework seeking to profit off bodies and lived experiences in an opaque and power skewed way [Crawford et al. 2015]. In “Numbered Lives” [Wernimont 2018], Jacqueline Wernimont’s feminist media history of quantification, the author interrogates the deeply gendered ways in which personal data tracking devices are used to monitor, surveil and police female bodies, while also placing the activities of affluent white (mostly male) American citizens in a powerful normative position [Duarte 2017]. These measurements ascribe what is and is not culturally valuable as “material-discursive practices of mattering” [Barad 2012]. For example, until quite recently, the leading quantified self (QS) tools did not offer the ability to track menstruation or breastfeeding as part of their everyday consumer measurement set. The casual neglect of fundamental activities of gendered self-care and care-of-others within data tracking media “means that women in particular are facing increasing constrictions on the kinds of selves that can be performed” [Wernimont 2018, p142].

Whether we see the data narratives coming from user desires, market pressures, or born of moral beliefs, they possess strong overtones of what mothers/parents ought to be doing and feeling in order to provide adequate care. They reinforce feelings that are socially acceptable, offering tips for engaging and stimulating the child’s development. Yet, common feelings of depression, rage, and regret experienced by mothers and parents are relegated to the responsibility of someone else. It is the adherence to such socially constructed roles that allows optimization technology to serve a performative role as “evidence” or “props” that characterize the good and caring parent, and where the data performance functions “not only as accumulation of cultural material but also as a source to how data lives and operates within a culture by its action” [Borggreen and Gade 2013]. Within the present day “risk society” [Beck 1992], where we have access to increasing amounts of data and mitigation techniques to avoid risk, the choice *not to* use a technology or data that might help care for a child can be increasingly charged as unwise, or even reckless. Such categorizations have powerful consequences and often do not include broader factors such as education level or access to health providers [Tsing 1990]. As such, families, and often mothers, can experience *more* anxiety and consequences when presented with additional expectations of care and technological pathways to explore.

### 3 ENVISIONING ALTERNATIVES TO QUANTIFICATION

Improvement narratives color medicine as much as they do design, and we find inspiration for alternative modes of design in descriptions of alternative forms of medical diagnosis and care. In “The Illness Narratives,” physician and anthropologist Arthur Kleinman criticizes the biomedical reduction of illness to a solely narrow focus on the alteration of biological structure. He makes the claim for a reconceptualization of medical care to include an “empathic witnessing of the existential experience of suffering” and to develop strategies for “practical coping with the major psychosocial crises...of that experience” [Kleinman 1988, p10]. This approach seeks to empower patients to develop their own explanatory narrative of their illness that is culturally informed and deeply personal. Similarly, it calls for clinicians and researchers in receiving these experiential stories to “unpack their own interpretive schemes, which are portmanteaus filled with personal and cultural biases” [Kleinman 1988, p53]. The current economic and administrative imperatives of the healthcare industry can make it challenging for clinicians and patients alike to authentically and regularly engage in this form of meaning making [Kleinman 2017]. For some, quantification proxies can begin to help fill this sensemaking vacuum through devices and platforms such as

wearable sensors, self-tracking apps, or online discussion forums. In this case, the technologies are enrolled to foster broader acts of care distributed across humans and technologies.

Joined by a wide-ranging movement in “narrative medicine,” Kleinman’s calls to attend to the emotional lives of patients/mothers highlights the need for narrative knowledge to compliment scientific and medical knowledge. “This kind of knowledge provides a rich, resonant comprehension of a singular person’s situation as it unfolds in time, whether in such texts as novels, newspaper stories, movies, and scripture or in such life settings as courtrooms, battlefields, marriages, and illness” and seeks to “illuminate the universally true by revealing the particular” [Charon 2001]. To bring fullness and a point of reflection to the “problems” of parenting, we turn our attention, now, to the kind of narratives (rather than solutions) that can be uniquely constructed through creative practice. As we make this leap from text and narrative to objects and performances, we look for inspiration from artists who have long had a forum through which to illustrate their experiences in the form of objects and experiences.

### 3.1 Finding Inspiration in Interactive Art Practice

In a video entitled “Optimization of Parenting,” an industrial robot arm is seen rhythmically rocking a particularly pink and frilly baby bassinet [Wagenknecht 2012]. The piece, created by Addie Wagenknecht is a commentary about the experience of parenting while attempting to maintain a creative practice. She writes the following:

Being a stay at home parent without help is literally like having four full time jobs in a row, all the time, without weekends or evenings off. And yet, if a woman was to spend 24 hours a day doing anything else, all the time, without stopping, people would think she was insane. Parenting, for whatever reason, is exempt from this insanity.

Her video reflects a sense of both frustration and optimism with new technologies as she envisions delegating repetitive tasks to technological assistants while at the same time reflecting on her experience as one who also must maintain particular robotic characteristics (e.g., provide care, do not require sleep, do not cry). Where Wagenknecht envisions a future where technology helps her perform routine tasks, others address such challenges through radical acceptance. For instance Lenka Clayton’s “Artist Residency in Motherhood” develops a series of devices and apparatuses that make her child present during her creative activities, converting her body into a portable studio that holds children as well as paper and pencils. She expanded this practice into an open source “residency,” inviting artists/mothers to join together to commit to making work in the wake of having children [Clayton 2016]. Projects like Sputniko!’s *Menstruation Machine* [Grosz 2014] and Lu Yang’s *Uterus Man* [Qin 2015] provide another perspective by using their creative personal practices to complicate notions of biology, sex, body, and ritual or religion and question how the category of “woman” is assigned. Researcher and creative producer Maya Livio’s *Tech in Women* series playfully subverts the common trope to support “women in tech” through examination and engagement of technologies designed for reproductive health. *In Music for Eggs* she commissioned a string quartet to compose a piece for her eggs and played this music for her eggs through Baby-Pod intravaginal speakers [BabyPod 2019]. By repurposing these speakers, originally designed for pregnant women to play audio such as Mozart or their voice directly to their unborn children, she highlights how technologies for women “have reinforced societal pressures on women to be ‘good’ mothers at continuously earlier stages of childhood development, and have privileged particular conceptions of ‘culture’” [Livio 2018]. In doing so she celebrates all of her eggs, including the ones that have not and may not ever become fertilized.

Together, these pieces help us see, feel, and sense the experience of their creator. They can also help designers envision alternative modes of engaging uncertainty, staying with it rather than bringing it toward clarity. As Rebecca Solnit writes, “for artists of all stripes, the unknown, the idea or the form or the tale that has not yet arrived, is what must be found.” [Solnit 2006, p5]. While creative fields like art, film and fiction offer a place (to some degree) where these experiences can be rendered, design has not yet shared this privilege. The fullness of narratives gleaned through a design process appears in reports as justification for needs and next steps. In this sense, such narratives must necessarily be anonymized, reduced, and oriented towards actionable measures. The heart of the experience and imprint or knowledge of the person who experienced it are largely invisible.

## 4 UNEARTHING FELT EXPERIENCE THROUGH DESIGN MEMOIRS

It is in relation to the (in)visibility, equity, and thinness of design narratives where first person design methods could be and have been particularly valuable [e.g., Forlano 2017; Desjardins and Ball 2018; Bennett and Rosner 2019]. In previous work, we introduce Design Memoirs as a method for drawing out thicker emotional narratives [Devendorf et al. 2020]. Design Memoirs offer “another way of telling,” where the things created themselves speak in social, political, and historical terms, and aim, in John Berger’s words, to acquire in remembering “something of the surprising conclusiveness of that which was and is” [Berger 1995, p293]. Design Memoirs join other first-person and semi-fictional approaches aimed at bringing attention to subject areas our community has, at times, resisted [Bardzell et al. 2015; Ahmed et al. 2018] or that might be ethically problematic to deploy on “users” [Bredies 2015]. Within the context of HCI, we see the true value of a first person perspective in this ability to sideline subjects as “those who designers can rescue with their human-centered know-how,” to more thoughtful and imaginative treatments of how it feels to endure particular experiences, the absurdity of some of the solutions posed, the hybrid utopian and dystopian prospects of seemingly inevitable technological intervention, and celebrations of biological actions deemed useless by others.

### 4.1 Situating our Work Within HCI for Women’s Health

This project takes an oblique approach to work that is traditionally considered to fall under the banner of health, taking it out of the realm of statistics and best practices to focus, if only for a moment, on the lived and felt experience of maintaining our own physical and emotional health. As the implied users of systems designed with our best interests in mind, we aim to speak back to designers to provoke a moment of questioning or complication that frames innovations in health within broader aspects of everyday life. We hope this work shifts technologies designed as “ands” (e.g., you should get rest and breastfeed and practice self-care) to deal with the inevitability of “ors” or “not-at-alls” (e.g., should I nap or clean the house? Should I respond to those e-mails or prepare homemade iron-rich baby food?). While technology has proven to simplify particular tasks, it is still adding straws to a pile that is dangerously close to falling apart.

We are joined in our effort to broaden narratives of women’s health by other researchers in HCI [Ayobi et al. 2017; Figueiredo et al. 2017]. For instance, recent work focusing on menstruation [Søndergaard and Hansen 2016; Fox et al. 2018] has brought visibility to an experience many women feel uncomfortable (and in many ways, are unwelcome) to speak about publicly. This takes the form of public IoT support [Fox et al. 2018] as well as tactics for using “maker” technology to create new innovations in support of menstruation [McDonald et al. 2018]. While our particular focus centers on motherhood, it is only one of many contexts facing challenges with privacy and social norms or status as taboo subjects. Work that focuses on women’s rage and struggles with “failure” [Rosner and Fox 2016], sexual health [Almeida et al. 2016a, b; Homewood and Heyer

2017], and menopause [Bardzell et al. 2019; Homewood 2019; Lazar et al. 2019] reveals a much broader set of approaches to health beyond the optimization narratives prevalent in commercial technology. These include designs focused on understanding one's body [Almeida et al. 2016b] or speculating on new rites of passage made possible by "smart" innovations for contraception [Homewood and Heyer 2017]. The use of novel techniques in this work, such as Homewood's use of performative ethnography, speaks to the key role embodiment and re-enactment play in bringing forth authentic experiences (as opposed to reiterations of how one feels they *ought* to feel). We see this project as pushing this forward through the focus on emotional and first-person perspectives.

Our advocating for more attention to the personal, emotional, and felt aspects of women's experiences requires a great degree of emotional labor on the part of the designer [Moncur 2013; Balaam et al. 2019]. Recent calls to acknowledge the emotional labor of experience-centered design for both researchers and subjects highlight the ethical dilemmas and challenges of engaging in deeply emotional experiences or investigations [Balaam et al. 2019]. They call for our community to draw from broader resources when attempting to understand the emotional labor of specific life events (such as caring for a parent with dementia) instead of defaulting to user interviews and interventions by default. These other resources that designers could draw from include the authors' own first person recollections as well as artworks and literature, such as memoirs, that could specifically make the emotional landscape of these experiences resonant.

We see our Design Memoirs as one such method to investigate the felt experiences of fundamental uncertainty. While the textual form of a first-person account highlights the specific contexts and challenges (and benefits) faced by researchers in their practices, we see design objects existing on an orthogonal plane, bringing forth a different way for audiences to understand and connect to the experiences.

## 4.2 Making Design Memoirs of Motherhood

Alongside writing about our concerns with optimization narratives, we wanted to commit to the process by bringing our own personal experiences into the conversation. Our approach builds on recent calls, by Wernimont and others, for a resistant engagement with data abstracted from the human body, pivoting instead towards returning the data to the body in re-materialized form, making it into "something that one can touch, feel, own, give, share, and spend time with" [Wernimont 2018, p163]. Design methodologies that argue for human participation in research often claim that the more sincere and emotionally true this participation is the higher its value. By participating with content from our own personal lives, we wanted to explore such processes from the other side, requiring us to break the assumed professional distance and to stress-test the process in terms of the emotional toll required for such candid participation.

Yet, we immediately found ourselves struggling with our twin aims, i.e., to explore a method for collecting emotional content and to share our own emotional experiences. One requires us to engage with the process in our professional capacities and the other pushes us to engage with the subjects from within our own experiences and skills. We proceeded as follows.

Each author created a series of objects in the form of a Design Memoir. Devendorf's *Intimate Exoskeletons* are an attempt to wrestle with the discomfort and demands she feels as a parent through the form of body-worn protective garments; Kelliher's *Done Medals* honor her ability to endure fertility treatment cycles through the fabrication of medals marking her experience; and Andersen's *Pockets* reflect on the daily practices of secrecy and adaptation to the everyday. In the following sections, each author explains their project from a first-person perspective.

**4.2.1 *Intimate Exoskeletons* (Laura)** The Intimate Exoskeletons were born from a growing sense of rage. Each morning for the past few years, for a period of about 2 hours, I am



Fig. 1. The exoskeleton for sucking allows others to suck on me while protecting my body.

physically overcome by a feeling of pressure, as though the air around me is taking on weight and pressing against my chest. While I have long experiences of dealing with anxiety, which also locates somewhere behind my sternum, this feeling is different. It takes the form of a scream, held in my body, that is begging to be released into the world. Unable to understand how or what to do with this rage, and the social pressure I feel that prevents me from just screaming, I tried to give form to it. Specifically, I read a book about the history of the *Spacesuit* which described flight suits and corsets as kinds of body architectures—structures for making our bodies robust to harsh environments (be they social or outer space) [Monchaux 2011]. I began to wonder what my protection systems would look like if I could make the harsh environment that was causing me to want me to scream, visible. This environment was one in which my time was endlessly occupied by others, where there never seemed to space to rest, and where I berated myself for always letting someone down (whether it was work or family). I felt as though I were wasting away, physically and emotionally. I made the garments as a container that at once might support me while at the same time, making its systems of support visible to an outsider—to render my screaming visible if not heard.

I created the Nipple Poncho (Figure 1), also known as an exoskeleton for sucking, by hand crocheting hexagons around pacifier nipples. The nipples offer everyone in my environment the ability to safely suck (children and others) on me while protecting my physical body. The repeated process of construction, knotting, and purchasing and puncturing pacifier nipples, gave me an outlet for mindless reflection while also prompting me to think of the other things that become repetitive in my daily routines, as though each knot was “go to sleep, wake up, make food, take kids to school, have meetings, teach, go home, eat dinner, play, watch mindless television, repeat.” I see the playful form of the garment as a kind of defense mechanism in itself, to try to overcome my rage by taking it less seriously, of being afraid to make someone uncomfortable while at the same time, offering them a prosthetic of my body to sate their needs.

The exoskeleton for sedimentation (Figure 2) emerged as a way to accept and take records (perhaps collecting physical evidence) of the pressures upon my body. I designed and hand-wove the garment on a TC2 digital jacquard loom. I wanted the garment to conjure images of erosion and sedimentation, the way that bodies and masses are built up in friction with one and other so I selected a series of yarn colors from images of sedimented rock formations. I made the first prototype out of muslin fabric and placed rectangular patches in all the places where my daughters place their weight on my body—my hips, waist, chest, and behind my neck. I wove conductive force



Fig. 2. The exoskeleton for sedimentation is a proposal for a garment senses and records pressures upon the body.

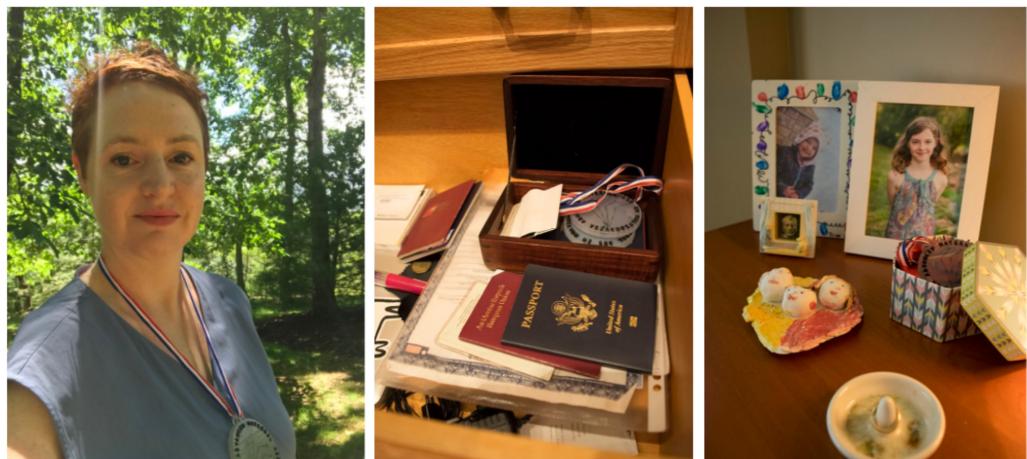


Fig. 3. The Done Medals commemorate the completion of an assisted fertility treatment cycle, publicly, privately, and semi-publicly.

sensing patches into those regions on the final garment so that these pressures could be physically collected, stored, and replayed.

**4.2.2 Done Medals (Aisling)** The idea for the Done Medals originated from multiple places, including my professional observations about the growing emerging topic of *intimate design* and research, curiosity about the work shown and discussed at the 2019 Fertility Arts Fest held in London, and a personal reckoning that it was time to close out and reorient a difficult time in my family life (Figure 3). Archiving the mountains of assisted fertility paperwork from three clinics, disposing of unusable prescriptions, and making final backup copies of complex scheduling spreadsheets brought not only a sense of relief but also a desire to do something more with this mostly private experience. I began to want a way to recognize the physical, psychological, and emotional labor endured during fertility cycles by acting on it myself, as opposed to receiving a material “push



Fig. 4. Tinkercad rendering of the Done Medals and the prototype print.

gift" from another individual. The notion of designing and producing a personalized medal for myself took hold as something that could simply attest to the fact that I had undertaken this process and it was done. For me, the medals help reorient the deeply felt sad, desperate, and shameful emotions encapsulating the experience at the time and point them instead in a more positive, reflective direction. It is important to note here that I constrain and limit my Design Memoir to only my interpretation of assisted fertility cycles, others may of course feel very differently of their own experiences in this regard.

To date, this Design Memoir consists of two prototype medals representing two of the five cycles I experienced. These cycles were carried out in virtual secrecy, due to familial work constraints and responsibilities, the perceived social stigma of being an older mother, the desire to be seen as a productive colleague at a new institution, the national and institutional disregard for secondary infertility as a recognized medical condition, and the challenges of moving to a rural environment after years of city living. The prototypes, rendered and pictured in Figure 4, affirm and reorient the diagnosis, the obsessive data collection, the thousands of miles traveled, and the bodily interventions across fertility cycles. My advanced age diagnosis is embossed and displayed prominently on the circumference of the medallion. The hundreds of self-injections are represented by miniaturized groups of syringes embedded in the medal according to the roadway route from my home (on the right) to the fertility clinic on the left, 153.5 miles away. Back and forth, I drove, mostly alone, anxiously hoping and fretting, across the Appalachian Mountains. Four of the most significant journeys are displayed in the medal depicted above; two at a lower z-axis level representing my drive back to the clinic for an ultimately aborted cycle, and the memory of the pain, sadness, and despair I experienced on the drive back; and two at a higher z-axis that represent the happier return journeys in the fifth and finally successful cycle. The medals can be worn publicly as a talking point, squirreled away in the "important documents" drawer, or perhaps placed on a nightstand for everyday viewing pleasure.

The medals were designed in Tinkercad and printed using a simultaneous multi-material jetting technology using transparent VeroClear filament for the medallion holder component and the rubbery Tango Black Plus material for the embossed letters and the syringes embedded within.



Fig. 5. Repetition (expecting different outcomes). Materials: linen, paint and embroidery. Subjects: madness and determination. A pocket of embroidery linen is colored blue and added to a pocket-less dress. A traditional Sashiko pattern is modified into the rectilinear thread structure of the linen. As the pocket curves it becomes increasingly hard to reconcile the patterns on either side of the seam. The continued determined work to do so, constitutes the madness aspect of the construction, it will never be done, it will never fit. It still has to be done.

4.2.3 *Pockets (Kristina)*. The pockets form part of an ongoing long term project exploring the role of (garment) pockets as sites of power, secrecy and agency in my own life and others' [Andersen and Berzowska 2006; Nachtigall and Andersen 2018]. Born from experiences of powerlessness, the pockets provide a practical potential of smuggling systems-of-survival, as they range from practical solutions (tampons, money, drugs) over material for expression and mental freedom (writing, embroidery, unpicking) to symbolic objects of memories and power (stone, safety pin, tool). As described in an article by Chelsea Summers "men's clothing tends to have capacious, visible pockets; women's clothing tends to have small pockets, if any at all. Content with their pockets, men have little to say about them, but women have been complaining about the inadequacy of their pockets for more than a century" [Summers 2016]. As such, the history of women's pockets is deeply entangled with woman's status in society giving or not giving them the freedom to navigate public spaces with the tools they require. By making use of this situation of "pocketlessness," the pocket project aims to make small seemingly harmless interventions that hint at what I may want to empower, conceal and keep safe. As a design object, the pocket is a container not yet filled. What I keep in them dictates what I can do, what actions I am prepared for. Folds and pockets add depth to the space immediately around us. Rather than surface area, they form a kind of intermediate zone, not clearly belonging to the body, the intimate self, or to the public, communal self. In this way the pockets are a way to add a buffer zone between myself and the external world, making the difficult more manageable. I include four different pockets here, they are made for myself, my mother and my daughter, as my response to where we are right now. The pockets are all worn in our everyday lives (Figure 5).

### 4.3 The Experience of Making About

The making process was characterized by a number of shared experiences. We found that there were really very few choices in what we could make; certain skills and experiences would dominate our creativity, certain themes would push themselves to the front. While the overall subject was centered around parenting, the individual details and angles were dominated by processes we had personally experienced, or were in the middle of, and the level to which they (still) fester and



Fig. 6. Collaboration (with moths). Materials: cashmere and cotton jersey, subjects: defeat and thrift. A much loved sweater falls prey to this winter's moth attack, prompting purging, washing, freezing, and repairs of the wardrobe. This sweater however is twelve years old, irreplaceable, unrepairable, and tied in with the memories of grief, defiance, and hope of that time. So the hole, made by the moths, becomes the opening to a pocket behind it, the placement perfect for tokens of all kinds.



Fig. 7. Anywhere (but here). Materials: shirt and money, subjects: secrecy and flight. Money is sewn into the collar of a shirt, providing freedom and the possibility for flight. This pocket is hardly a pocket at all, it is a slow transition of power.

rankle. We found that we would return to making processes in which we were comfortable, finding it difficult to express ourselves in new materials and novel techniques. The Done Medals are an exception to this, as in this case, the designer moved away from the familiar professional realm of creating storytelling software for others, and instead sought to encapsulate her own story within a tangible object. This required experimenting with and learning to use new 3D design tools and seeking collaborative guidance from additive manufacturing experts.

While making our memoirs, we also experienced waves of hesitation, for each of us the subjects were raw and while we were all somewhat comfortable making each object, a general observation is that we found it hard to write the descriptions above and that they, as a result, are less forthcoming than the objects themselves. Each of the Design Memoirs are wearable to some extent, but the experience of wearing them differs from project to project (Figure 6 and Figure 7).

In the case of the exoskeletons, they were crafted functional “garments” that call into question the body between self and other and the tensions that emerge upon that boundary (both



Fig. 8. Stay (pocket for heart monitor). Materials: linen, paper and cotton, subjects: sorrow. This is a bag for a heart monitor, to replace the one made from plastic and paper deployed by many cardiology wards. Instead this one is linen, cotton and paper. Almost the same. Threads are pulled from the linen and embroidered in. It is an ongoing process, it ultimately did not work, it still cannot be written about.

literally and figuratively). The nipple poncho has been “used” as a prop that I would discuss with other artist/mothers and that I have presented to colleagues and displayed among other “smart” products in my research lab. It has garnered chuckles, candid empathetic discussions, and also discomfort among those who cannot identify. It indeed provides pleasure to my now 4 years old who lights up and sucks voraciously upon the garment when I wear it. In terms of construction, the wool yarns are going to be quickly overtaken by the weight of the pacifier nipples, so sagging is imminent. The exoskeleton for sedimentation remains the concept that is most viable within my own mind as a possible future for smart garments that become dirty with history and that commemorate, rather than attempt to relieve, struggles. I am still working on techniques for force sensing and developing associated hardware and have created a second working prototype that is being exhibited as a smart tapestry at a large company. The project overall has heightened my attention to moments of holding and being held. During technical demonstrations where I show the work, people commonly refer to it as a “hug” measuring garment and struggle to communicate the more subtle relationships between form and being formed—the different endurances required for holding and hugging. I wore the exoskeleton for sedimentation during TEI 2019 and told the story of its creation to aisling prior to this collaboration. She later pulled me aside and said “I want in,” referring to the project of then making technologies around our experiences of emotional labor. It is an instance of the garment, itself, garnering the kind of social support and recognition that I felt I needed (Figure 8).

In the case of the pockets, they were all incorporated into existing clothing or functional wearing experiences, and they are all still in use inside these garments. This is especially true for the first two pockets that are worn as a matter of everyday routine, and repeatedly rediscovered and re-experienced. The repetition pocket remains a work in progress, practically it is hard to keep working on the pattern and I am increasingly accepting of the fact that this difficulty remains its point. As such it functions as a monument to that which cannot be fixed and as it is worn it feels like a scar or a tear, my fingers run over it as I wear it, and I go: Oh yes, there it is. The Collaboration pocket is fitted into a very soft sweater and through the making process these qualities were discovered by my daughter, who now wears it to school in what feels like a poetic act of closure (to me). Meanwhile the anywhere pocket I created for her is entirely impractical and symbolic. However, through the taking of the photograph it facilitated a complex conversation about the

desire to both flee and stay that became both its function and value. The stay pocket was given to my mother as a gift, it was not used, but rather served as a symbolic act of acknowledgement; I could not always be there for every appointment, but I was acutely aware of the stakes and tried to be “there” to the extent that this was possible over distance. The pocket acknowledged this, and it was part of our understanding. It was of course, in retrospect, an object of magical thinking, and as it turned out, a wholly inadequate and devastatingly weak magic at that.

The Done Medals were designed and precision printed to deliberately play with notions of lived experience visibility in terms of the transparent material form, while the embedded/embossed nature of the medal itself spoke to the bodily penetration/extraction procedures experienced by the author. During construction, conversations with some colleagues and collaborators about my experience provoked squeamish responses, which quickly returned to more comfortable territory discussing optimal technical settings for the printing machines (the irony). More recently however, the introduction of the work within the context of a video presentation [e.g., SIGCHI 2020] provides an alternate mutually understood space for (perhaps now COVID limited) public discussion. I carried the medal in my pocket to a workplace meeting predicted to be difficult, and during contentious moments, it was comforting to feel and hold my medal talisman in my pocket, and indeed, it helped me to stand my ground. In response to a friend who wanted to know if I would make them for other people or even sell them, I found myself thinking about the 1000s of jewelry items for sale on platforms such as Etsy representing fertility, gender reveals, miscarriages, and bereavement. I personally orient away from the regular wearing of my Design Memoir, categorizing it as a medal meant as most amateur medals are for very occasional wear and/or for private review in the home. I also note my clear preference to engage with my medal of ultimate success and not the medal of the second last failed attempt. This makes me question the framing of my commemorative approach; would I have ever attempted to craft a Design Memoir and expose it publicly if all attempts had failed? Moving forward with my own design work across multiple domains, the experience with our Design Memoirs makes me I hope more mindful about the felt worst thing that could happen and more likely to extend careful caution to the experiences of others.

A third immediate observation was that we felt too respectful of each other’s experiences to feel able to speak to them. This means that each project was simply presented to the group within the gravitas of the situation and while we as a group were able to feel empathetic to the experience and express this, we were not able to use these objects as stepping stones to generalize to other experiences or objects. The following step in the process of creating diffractive readings was born directly from this observation. Having found ways to express ourselves about experiences we found difficult to otherwise discuss, we needed to find a way to share the ownership of the concerns raised in such a way that they could be engaged with in a designer fashion and beyond the implied distance of polite empathy.

## 5 DIFFRACTIVELY READING OUR DESIGN MEMOIRS

As we look across our Design Memoirs, they reveal an emphasis on being seen and concealing, on memories and planning, on the wish for power and the frustrations of its absence. As we discussed how we might find meaning in the objects we produced, we came to the conclusion that we ought to look at our Design Memoirs in dyads, effectively reading and questioning one through the other. In doing so, we found ourselves extending a strategy of diffractive readings of text [van der Tuin 2016] to the reading and interpreting of objects as a way of both attending to them and exploring the resonance between their material-semiotic expressions. Such circulations and readings of our design objects allow us to engage intimately rather than critically to each design memoir juxtaposition, and pay attention to any new notions, directions, and disturbances as they emerge. In doing so, we keep in mind that the Design Memoirs are fragile models of new things, and

so their interrogation and readings are done gently, with a focus on exploration and investigation rather than assessments of their criticality. We aim, as Kleinman states, to approach a form of empathic witnessing, although while we might not have any practical suggestions for each other for pragmatic coping, we can at least attend to and recognize the psychosocial dynamics at play.

### 5.1 Medals + Pockets

The medals and the pockets relate to each other in multiple ways. The pocket turns the medal into a secret accomplishment, a marker of change, kept like a talisman or a lucky stone, secretly marking bravery and functioning as a potential source of tangible comfort in times of need. In return the medal makes the pocket into a mark of pride, a scar carried with acknowledgement of its history. The pocket and the medal combined provide opportunities for new personal and social rituals, where they can be used to bolster individual encouragement, or to signal interpersonal solidarity (much as the knowing looks exchanged when “the breast pump bag” is noticed in professional settings).

Even if we stay with the current shape and actuality of these two sets of objects, we can imagine the pocket as an alternative occasional place for the medal, heavy, present like a secret ballast or “gravitas,” the heavy form of dignity, earned through experience or hardship. We may see this in contrast to the military wearing of a commendation medal. Medals inhabit a fascinating historical point as objects of recognition, traditionally given for military service or athletic excellence. They identify the role of the hero and indicate the possibility of obtaining power through luck, bravery, hard work, and excellence. Instead of an object of displayed pride, the pocketed medal is a talisman of experience or sacrifice to be worn only on certain days or possibly never. By placing the medal in a pocket we are not signaling external power, but rather indicating personal accomplishment and supporting or confirming the self-image of the wearer.

### 5.2 Pockets + Exoskeletons

The exoskeleton can effectively be seen as an inside-out pocket. When retracted into a fold or a pocket, the exoskeleton is all potential and power; it fills the wearer with confidence like an airbag or parachute. And as such it provides the potential that we will be okay in moments of emergency and peril. In this manner, the exoskeleton can be carried with us to be deployed when needed. It makes us braver, stronger, hides us from the desires and demands of others; but also gives us cover, buys us time, and provides the potential for (the ineffectual illusion of) sanctuary.

Taking the same line of thought, reading the pocket through the lens of the exoskeleton, we can imagine an exoskeleton that is all pockets. On one hand, to represent the vast amounts of things carried on the body and on the other as a suggestion of the need to hide. Perhaps the entire pocket exoskeleton inverts to cloak the wearer. The exoskeleton of pockets allows itself to be filled with resources (or non-resources) in reflection of experience and time. As such, it may carry sustenance or regrets, protection or weapons.

Together the exoskeleton and the pocket form an exercise in telling stories both in secret and in public. Of whispering under your breath and shouting at the top of your lungs, of rehearsing at future moments of both bravery and fear. Different sets of actors and spectators carry different sets of politics of exposure and retraction. What might these devices cloak and make habitable? Such devices and symbolic items incorporate a sense of humor, not to make others laugh, but to allow the maker to simply deal and proceed in the face of difficulty. Sometimes the ridiculous forms a rescue float of a kind; the preposterous execution of these ideas constitutes a defense against shame and silence. In this sense, it is the feeling of it, not the look of it, that matters.

### 5.3 Exoskeletons + Medals

The exoskeleton and the medal are both objects of display and communication, but while the medal commemorates endured achievement, the exoskeleton forms both a distraction from, and an expression of, a fear or a concern. Time plays a role here, the medal reflects past endured episodes and a physicalization of events, while the exoskeleton protects the wearer in the present, in preparation for the future. In that sense, both projects seen together collapse the past and the future into a forward/backward looking now, allowing the wearer the ability to act with agency and force.

When brought into relationship with one another, the two forms speak to the nature of time, experience, and endurance while reconfiguring the mother as a warrior in battle and honored for her achievements [Vertosick 2001]. The comparison brings comfort in the sense that it marks the passage of time and shifting nature of experience, creating a space for hopefulness in futures where one has the ability to look from the outside, to selectively remember the bits and pieces that bring pride or fondness. When compared to the sedimentation exoskeletons specifically, the done medals give form and value to the struggle experienced. They offer us the gift of marking and remembering while also highlighting the personal nature of what we want to remember. Where the exoskeleton explicitly creates a trace of the work of coexistence between mother and daughter, the medals dismiss the spreadsheets, notebooks, and data tracking apps of corporeal measurement, in favor of a selective memorialization of the most meaningful events in the process.

### 5.4 Diffractive Readings as Experience

We began our diffractive readings by looking at the emergent meanings of our paired objects in terms of their emotional suggestions, physical forms, and perceived affordances. This playful and almost absurdist form of reading helped us lighten the work of reflecting on difficult experiences. The objects became detached from the weight of their histories and could more freely form new meanings, connections, and combinations apart from the anchor to one life and one story. This helped us think about ways to generalize across our experiences while still being able to own them in their specificity. As such, the emergent products, services, themes, and emotions we envisioned were not a blend of two experiences, or the intersection of yours and my feelings, but a co-production emergent but distinct from the bodies involved—becoming specific while being about no one experience in particular.

In creating these diffractions, we departed from ourselves and engaged in another's experiences. We mixed and matched aspects of our experiences and designs, turning them over in our minds to produce a different sense of reading the work of the other. This seemed to be facilitated by the objects' ability to hold multiple narratives at once. It was within these connections that we were able to identify less with the ineffable aspects of emotion and how they seem to shift, invert, swing, and shake. We felt as though we could know of these relationships and how they felt without the shared experience. We could empathize and reckon with the noise, not the signal.

## 6 DISCUSSION

“How do you calculate upon the unforeseen? It seems to be an art of recognizing the role of the unforeseen, of keeping your balance amid surprises, of collaborating with chance, of recognizing that there are some essential mysteries in the world and thereby a limit to calculation, to plan, to control. To calculate upon the unforeseen is perhaps exactly the paradoxical operation that life most requires of us.” [Solnit 2006, p5]

The experience of fundamental uncertainty expressed in Solnit's use of the term “unforeseen” is one that continually begs for recognition and resists our best efforts to harness it through means

of calculation and control. As we discussed in the introduction, this places our current practices of design in a precarious position regarding how to design with and for the unforeseen? While we cannot claim that practices of quantification are harmful for all, we know that they were distressing for us personally, and thus we attempted to resist our desire to quantify the unforeseen as we felt it addresses “the scratch but not the itch” [McLuhan and Fiore 1967]. Making, sharing, and remaking our Design Memoirs provided us with a way to collaborate with “the itch” in the form of marking it, rendering it, and sharing it among ourselves.

While we found our experiences of creating, sharing, and blurring the boundaries between our memoirs as a way to systematically engage the fundamental uncertainties of motherhood, we struggled to understand what these explorations might mean to our community more broadly because, methodologically speaking, they will never be able to stand up to the notions of rigor and validity characterizing most of what is published as design research. How do we even know if we are doing good research or selfishly drawing on and exploiting our privilege so that others will attend to our personal challenges and preferences? How do we know if making Design Memoirs will be beneficial or detrimental to the health of others who experience these challenges? The answer to these questions is that we do not know (an answer that, we also acknowledge, is only able to be stated by those with sufficient privilege [Haraway and Goodeve 2013, p42]). In the wake of not knowing, we do not advocate that anyone ask others to undertake these methods as part of a “study” or “solution” to the challenges mother’s, or any others face. We intend to provide our own experiences to advocate for others in our community to tread lightly when dealing with mothers and parents. This is asking designers to consider the problem without concrete paths to solutions, and to simply find space to be with and listen to those who might be undergoing this experience. Instead of treating emotions as sliding between binary poles (less happy = more sad, more calm = less stress), we encourage designers to see more complex terrains of emotion and acknowledge the way in which particular feelings such as pride emerge from struggle. Furthermore, we encourage designers to acknowledge how the emotional terrain changes between the present and the past. In agreement with Sarah Homewood who argues for inaction as a positive design decision for supporting menopause [Homewood 2019], we see a benefit to simply witnessing, standing by, and sidelining desires for improvement.

The following sections represent our attempts to communicate our findings, to make them relevant to design research, to understand what we can and cannot claim, and to draw out alternative qualities of value that bubble to the surface when we embrace our limitations.

## 6.1 Is Motherhood a Wicked Problem?

We began by looking at our design work as if it were rhetoric within an essay or argument, trying to make a convincing and perhaps emotionally resonant plea for designers to approach the challenges of parenting with care and humility. As a tactic to make this legible to practitioners and researchers working within the traditions of Design Thinking, we thought that we could use our experiences to describe motherhood as a “wicked problem”—“a social or cultural problem that is difficult or impossible to solve” [Rittel and Webber 1969; Kolko 2012]—and thus, call researchers to consider the complexity of the situation and impossibility of solution as they might with other issues like climate change or social justice. Our experiences could be seen to align with many of the core tenants of wicked problems particularly in that they are characterized by the inherent entanglement of contradictory interests and goals. One persons’ desires, emotions, struggles, and joys are necessarily entangled and constantly in flux over time. To consider the personal as wicked, particularly within the context of motherhood, seemed like a promising way to promote deeper engagement and inquiry with a greater orientation to the risks involved. It may help provoke an acknowledgement of the scale of the challenge before assuming a simplistic move toward a better state.

In response to comments from our reviewers, we considered this outcome more deeply, and we began to feel uncomfortable adding the term “problem” to motherhood. We felt that the use of the term problem, wicked as it may be, necessarily provokes questions of progress and solution that have given rise to the challenges that we experienced. Associating the problems with women as wicked also revealed some more unsettling roots. Particularly, associating the category of “woman” and “mother” to “wicked” brought out the quality of wicked as a deeply gendered term with a dark history of violence towards women. This observation gave us cause to consider this deeper underlying connection. Perhaps framing women’s experiences as the inspiration for problems has served design regimes that implicitly found only certain kinds of situations worthy of masculine/hegemonic interest. Rosner’s rethinking of the histories and formation of the dominant paradigms of design thinking relate to these ideas and looks toward the “fabulation” of broader ways of knowing and doing [Rosner 2018]. We consider our memoirs to be fabulations of this sort and needed an accompanying discussion that embraced the fabled and storied nature of such objects on their own terms. Similarly, we believed we needed a new way of framing our contribution to resist positioning the mothers’ body as deficient instead of honoring them it for its complexity.

## 6.2 Turning to Low Theory to Understand the Desire to Optimize

In Jack/Judith Halberstam’s book *The Queer Art of Failure*, he argues that failure, uselessness, and unknowing can form the foundation of “low theory.” Influenced by predecessors such as Antonio Gramsci and Stuart Hall, Halberstam contrasts disciplinarily sanctioned and normalized “high thought” in favor of the kinds of practices that become low by contrast. Low theory looks upon failure and stupidity as sites where alternative logics of knowing and doing can stem. In his words “terms like *serious* and *rigor* tend to be code words, in academia as well as other contexts, for disciplinary correctness; they signal a form of training and learning that confirms what is already known according to approved methods of knowing, but they do not allow for visionary insights or flights of fancy” [Halberstam 2011, p6]. In our project, we see this idea of the low emerging in addressing our own frailties as humans as well as within our design processes. It serves to transform a study of the personal from one that lacks rigor, to one that gains imagination and reflection upon the more sanctioned modes of practice (here, design thinking and wicked problems). This applies not only to how we understand our own experiences but also to how we understand our discipline more broadly. Perhaps quantification is the necessary outcome emerging from a disciplinary formulation oriented around problems and solutions rather than the choices of any designer *per se*. This leads us to ask if other logics of research and ways of knowing are needed in order for our findings (e.g., accepting our limitations and resisting improvements) to seem viable?

Discussing his work analyzing the challenges with universities and disciplinarily, the poet, performer, and theorist Fred Moten further articulates knowledge practices that engage the low. In his view, “study is what you do with other people. It’s talking and walking around with other people, working, dancing, suffering, some irreducible convergence of all three, held under the name of speculative practice” [Harney and Moten 2013; Wallace 2018]. Through this frame, we might understand Design Memoirs and the insights that can emerge as part of a speculative practice. They are better oriented to highlighting places where our systems of design and evaluation fall short, rather than highlighting strong recommendations for new design interventions. Both the individual prototypes and their dyadic cross-readings are in fact not “prototypes” in the sense that they are not developing or foreshadowing anything else, nor are they to be followed by better versions of themselves or even act as input or inspiration for projects or products of any kind. Instead they are attempts at providing thick and complex manifestations of experience, which are not aimed at generating clarity or even empathy, but rather a deepening and staying with a particular experience. In this sense, it is meaningless to explore the experience of wearing them or to analyze them

as artifacts. Instead they mark an experience and through making them they show and remind us how things are, were, might be, and might have been.

### 6.3 Turning to Shadow Feminisms to Make Space for Making Do

In addition to formulating a *low* theory and practice, Halberstam also engages the notion of “shadow feminisms,” which we see as a way to reflect on the kind of optimism that is inherent in narratives of motherhood. Shadow feminisms, must like the figure of the “feminist killjoy” [Ahmed 2010], present alternatives to optimism and making the best out of imperfect systems by dwelling in and studying failures. Their work uncovers “the perspective of the loser in a world that is interested only in winners” and aims to “poke holes in the toxic positivity of contemporary life” [Halberstam 2011, p3]. This complicated relationship with hope and positivity is also evident within community work with mothers [Rosner and Fox 2016] as well as within our Design Memoirs. We made forms that refigured our rage into palatable and humorous form, that consolidated years of struggle into symbolic plastic medals and fabric pockets. While at times, we need hopefulness and optimism to make it through our days, at others, we find intense value in explicitly rejecting these positive stances or taking on the role of the loser, in defiance of those who told us to practice self-care by offering them the nipples they truly desire, and injecting our care into others’ lives through the modest imposition of pockets. If our memoirs signal anything, they signal a desire to simply inhabit and take refuge, if only for a moment, the role of the negative thinker who, “relieved of the obligation to keep smiling through chemotherapy or bankruptcy, the negative thinker can use the experience of failure to confront the gross inequalities of everyday life in the United States” [Halberstam 2011, p4]. There is a relief in not optimizing, of not counting, of believing you have failed and simply sitting with, resting that sense of failure, and questioning what failure even means. There is a form of connection that uniquely comes of sharing failure, looking at it directly, and asking why it is experienced as such. It can help us (and maybe mothers more broadly), turn more attention to the systems within which our failure and inadequacy is formulated and described and take action towards change. By analogy, it can help designers turn their attention to the systems within which design is a practice of “changing existing situations into preferred ones” [Simon 1996], by asking whose preferences factor into these design equations or how this kind of state-diagram view of design might be too narrow to consider side effects, multiplicity, and entanglements that characterize everyday life.

Yet, to truly embrace shadow feminisms we need to confront its call for practices of “erasure” rather than the practices of memory that our memoirs suggest. Drawing from Saidiya Hartman, Halberstam describes how “memorialization has a tendency to tidy up disorderly histories” and how tradition and history are precisely what preserve and solidify values and systems that are oppressive. Here forgetting becomes a way of resisting the heroic and grand logics of recall and unleashes new forms of memory that relate more to spectrality than to hard evidence, to lost genealogies than to inheritance, to erasure than to inscription” [Halberstam 2011, p15]. Our own status and histories make it hard to fully comprehend the differences between spectral and codified histories. At the very least, it brings up another important boundary in the relationship between quantification and fundamental uncertainty, i.e., the line between what can be remembered and that which is allowed to be forgotten and the susceptibility or benefit memoirs may have with their meanings being un/re/over-written.

## 7 CONCLUSION

The process of making Design Memoirs, reflecting on the values in our practice, and studying the emergent qualities born at the intersection of our individual experiences has given rise to understandings that maintain complexity. The focus on the felt and embodied brought forth in

relationship to time and distance, the changing of present and memory, and the characterizations we take on as mothers and academics—sensitive, concealing, and proud. By taking an approach privileging the personal within our methodology and drawing from the projects in dyads, we came to see Design Memoirs as a way to allow insights to hang together despite their apparent contradiction (e.g., the vulnerable warrior, needing backup and being enough, the desire to remember and yet stay connected to struggle), or the nature of human emotion and experience as multiple and co-existent. While these are necessarily difficult to translate into specific design requirements, the unique gestalts they pose can be seen as a frame to guide a process for other designers in their processes of wayfinding, rather than processes of determining the specificity of their outcome. More specifically, they guide us into the territories of uncertainty and allow us to meet it on its own terms. The Design Memoirs described here do not serve as facilitators of counting, monitoring and optimizing, but instead they are expressions of the personal toll of this ongoing labor. Here, we are suggesting that women's experiences come with an intrinsic emotional and cognitive burden to which it would be useful as a community to bear witness. They are calls to simply acknowledge the felt, prior to implementing best practices.

Technologies for mothers are particularly fraught with moral platitudes and imagery highlighting the joys, pleasures, peaceful, and cute nature of children. They remind you of things to help your baby with, while turning away from feelings of rage, medicalization, fatigue, frustration, depression, and the physical exhaustion that mothers experience. Therefore, they may exacerbate these challenges by denying the broader lived experience in which they are deployed. In this article, we have attempted to approach this area with care and playfulness, in order to find ways to address and speak to the authors' lived experiences, while acknowledging that at their core the conditions they refer to are largely and desirably unfixable. At the same time, we believe that it is important to describe not only these types of experiences existing throughout our interactions and design work but also those that are often untouched in favor of more easily addressed concerns or the lure of the better. We are not arguing against work in this area of maternal health, but rather suggesting that such work might be informed by a broader understanding of the unaddressed and chronic concerns that surround this issue. We inhabit these concerns, and for the longest time we did not even know how to describe them to each other without sounding overly negative or complaintive. The memoirs and by extension this text grew out of our dedication to both stay with these barely verbalized contradictions in our lives, while also discovering how to share them with each other. In order to do so we let our hands do the telling and the words find their way to something we can share.

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