

Drawing Maternal Machines and other Fantasies of Care

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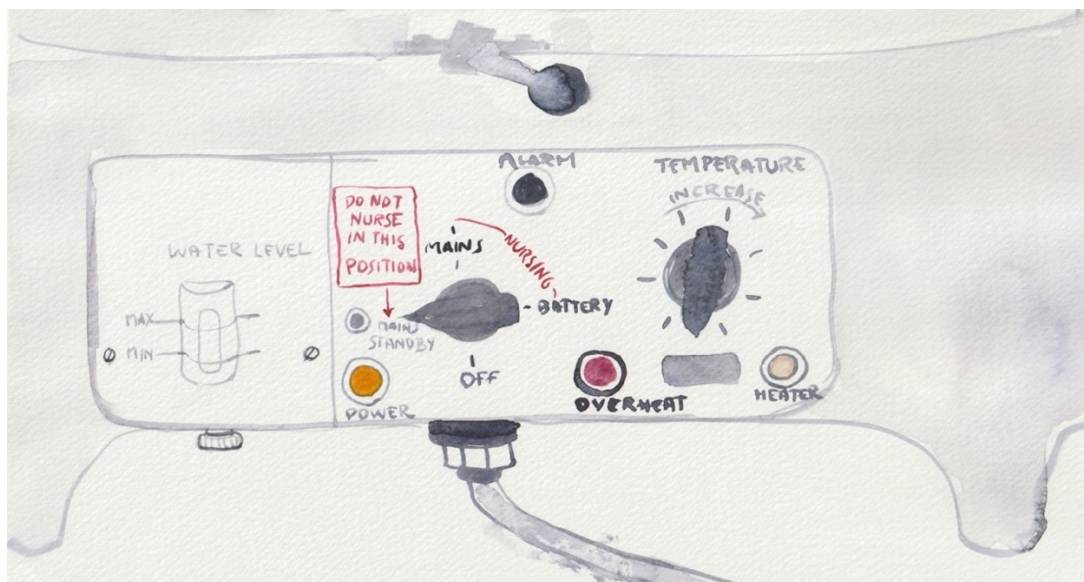


Figure 1: Watercolour drawing of switches from 1950s incubator. ©All drawings on this paper may not be used without the written consent of Paulina Yurman

Abstract

Ideations of artificial wombs, robotic nannies, cots with facial recognition and self-driving prams are part of a long history of motivations to use technologies to support, alter or even replace humans in situations of gestation, reproduction and care. Reflecting society's entangled fantasies about care and often reinforcing cultural tropes about gendered roles, the imagined possibilities about technologies in such sensitive and emotionally charged topics are worth examining. In this paper I present ways in which I have critically explored imaginaries and ideations in spaces related to maternal and infant care, accompanied by a practice of drawing that was fluid, creative, speculative, suggestive and communicative, and enabled an engagement with the complexity of machines and quantifying approaches that exist in a realm abundant with non-numerical and ancestral forms of bodily knowledge. Drawing was also useful in activities with participants, where we collectively discussed and imagined scenarios with technologies for care.

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INTRODUCTION: IMAGINARIES AND MACHINES FOR REPRODUCTION AND CARE

Aspirations to make use of technologies to support, monitor or even replace humans in spaces related to reproduction, gestation and care have existed throughout history. These have been manifested in works of literary fiction, film, animation, patented ideas and realised designs. Patent drawings of artificial uterus [15], apparatus to support childbirth through centrifugal force [6], visualisations of artificial wombs [10, 33], imagined scenarios with humanoid robot nannies [19, 29], robot mothers [43], or nursery robots [1, 30] are reflections of how this topic has for a long time fed into society's

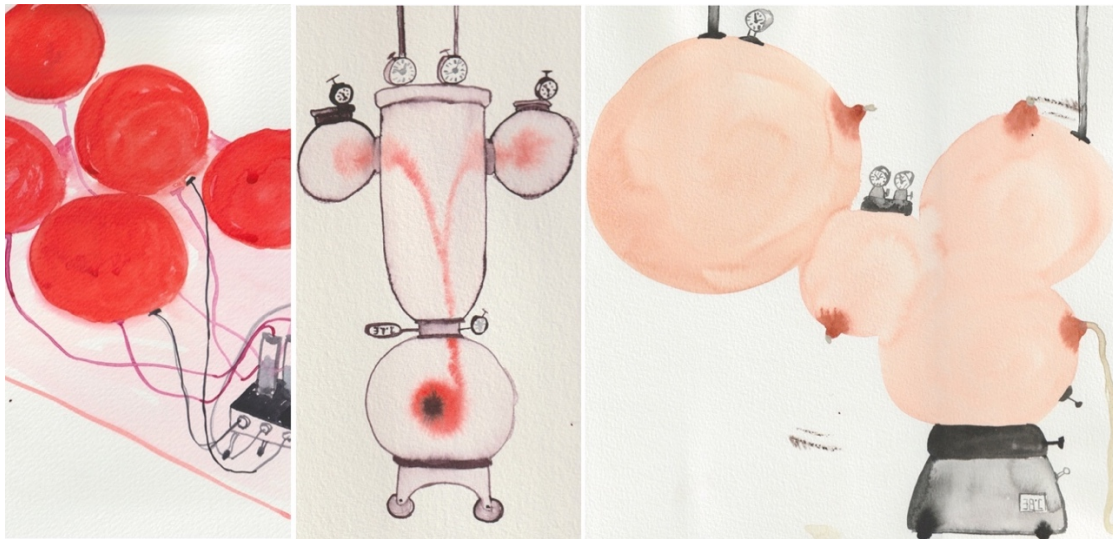


Figure 2: (left to right) My watercolour drawing of artificial womb shown in the Reprodutopia exhibition [33], drawing of artificial womb, informed by 1920's illustrations [24], and a speculative drawing.

dreams, fears and desires about care. Such ideations are interesting to look at from a design perspective, but they are also sources that can tell of the situated perspectives of those who imagined such scenarios. Early incubators, for example, created towards the end of the nineteenth century, were often displayed in public exhibitions (sometimes with infants inside them [3]), and were presented by obstetricians as possibly safer than the real uterus, due to mothers' behaviours, variably described as "over emotional, excessively stimulant, irresponsible, unstable or uncontrollable" [2], [3, 10, 20], and proposing the idea that machines could possibly be trusted more than humans in the care of babies. Early science fiction depictions of artificial wombs at times presented narratives that echoed eugenic principles, proposing selections of eggs originating from "normal mothers" [24]. Artificial wombs [33] and nurseries of the future [58] with automated scenarios where machines look after infants, or ideas about the homunculus, where little men could be grown in glass bottles by alchemists, form part of what some scholars describe as old patriarchal fantasies of control over reproduction and care that often produce an erasure of the body responsible for growing a baby, and of the network of humans involved in providing care [2, 10, 20]. Whilst many such ideations are the stuff of fiction, it is worth examining their narratives and acknowledge the extent to which design and technology contribute to the social construction of imaginaries around babies, the maternal, motherhood, parenthood and care [16, 32, 46]. With AI increasingly becoming integrated into situations of care, and as ideas about what technology can and cannot do proliferate, it is important to address ways in which biases and idealised notions of care in newly imagined scenarios might persist.

This paper presents diverse insights and ideas from *Maternal Machines: Design Speculations About Fantasies of Care* [57], a four-year long design research project that I lead and that explores and interrogates imaginaries and ideations (historical and contemporary) in spaces related to maternal and infant care whilst also

looking to identify potential design opportunities. The themes, ideas and questions presented here are not necessarily threaded together, reflecting the complex and diverse modes of thinking in my research. Accompanying these themes are my watercolour illustrations, which form part of my practice. A visual form of sense making of the research space, where the fluidity of bodies encounters machines [55], [56], my watercolour drawings engage with thoughts about forms of knowledge beyond quantifiable data that exist and leak into each other. Later in the paper, I briefly describe activities with participants, where drawings were used to visualise, discuss and imagine scenarios with technologies in organised workshops.

DRAWING WITH WATERCOLOUR, A FORM OF RESEARCH

There is an established recognition of the value of drawing as a practice for discovery and knowledge production in the design and HCI research community [7, 11, 13, 25–27, 39, 41, 44, 48, 49] and in diverse disciplines such as medicine [23], mathematics [36], biology [51] and physics [22]. Drawing is an intrinsic practice in my work as designer and researcher [55] and using watercolour has been particularly useful: the fluidity of the material helps to challenge usual representations of technological artefacts (often perceived as embodiments of objective precision), and brings ambiguity, defamiliarization and critical reflection. This has been helpful for exploring designs and technologies that often deal with the body and its fluids, and that bridge the gap between what is inside and what is outside of them. Many technologies used for maternal, infant, perinatal, reproductive and childbirth care engage with quantifiable aspects of the body, often overlooking aspects that are subjective and more difficult to measure with precision. Quantifying technologies in maternal and infant care coexist with forms of knowledge that are bodily, sensorial, non-numerical and often ancestral. Using

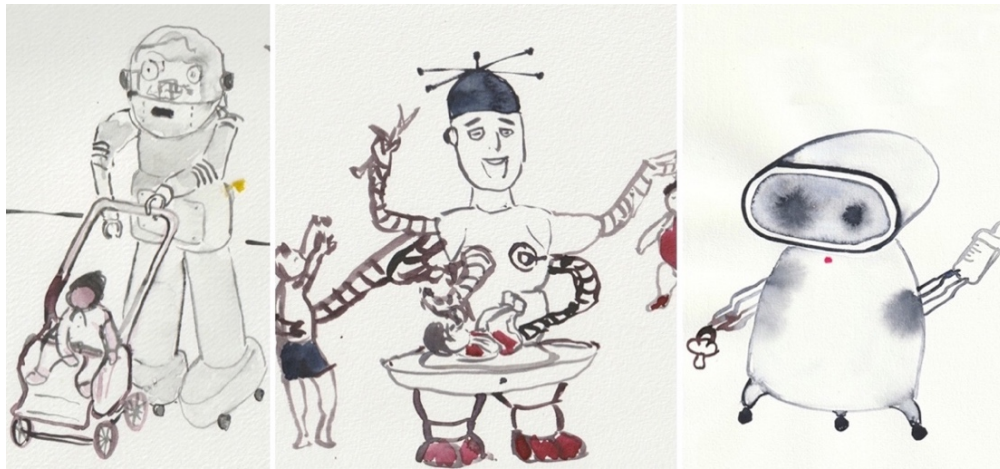


Figure 3: My watercolour drawings of (left to right): Welsh inventor David Weston's Robot as Nanny (1960), a robot mother from a 1950's Japanese illustration [70], a speculative drawing of robot companion for new parents.



Figure 4: Watercolour drawings of existing artefacts: AI powered stroller, smart cot, baby monitor and selection of various smart swing chairs.

watercolour to draw such technologies has encouraged forms of understanding and representing multiple forms of thinking where different ways of knowing bleed into each other.

The selected drawings and observations presented in this paper are the result of a practice of interrogation and sensemaking during the research project *Maternal Machines: Design Speculations About Fantasies of Care* [57] and are informed by observations of trends in consumer products, archival research on patents, historical designs and science fiction scenarios, and conversations with researchers in midwifery, obstetrics and AI, maternal and infant health, medical humanities, historians and researchers of ethics and AI. Through

the drawings, I explore ways in which designs and technologies for care have been ideated and imagined. Some of the drawings are ambiguous, inviting readers to make their own interpretations, but others are drawings of designs that I drew to understand better and engage with the way they might have been conceptualised. Later in this paper, I describe how the drawn artefacts were used in workshops with participants to facilitate discussions and collaborative creation of imagined scenarios.

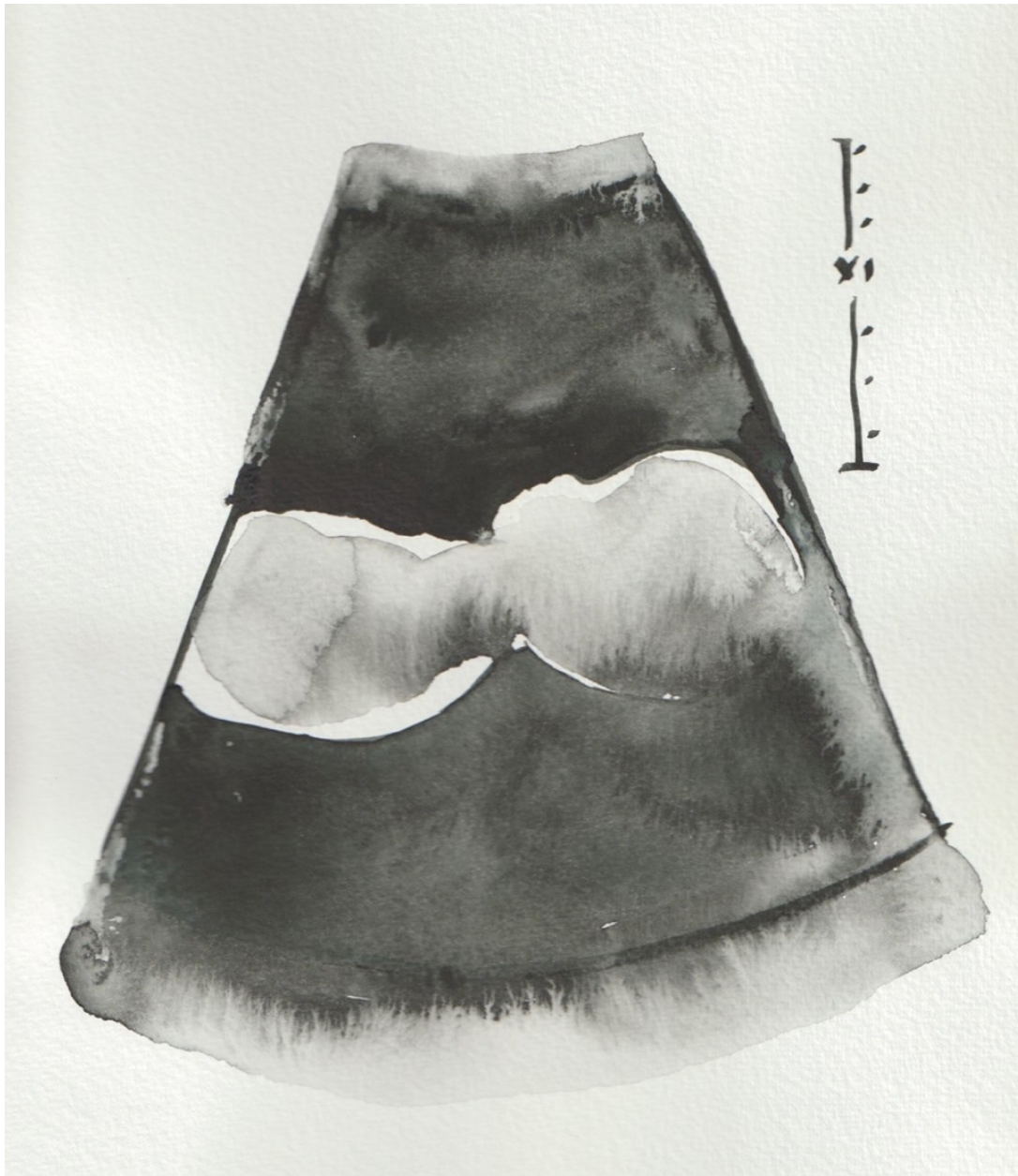


Figure 5: Watercolour drawing of a foetal ultrasound scan.

MACHINE AS MOTHER, MOTHER AS MACHINE

In 1958 Harry Harlow published a paper called *The Nature of Love*, describing experiments with infant rhesus monkeys “reared with the aid of a laboratory constructed mother substitute” [17, 18]. Two doll mothers, one made with wire and a bottle dispensing milk (“a unibreast, thus eliminating redundancy of breasts” [17]), the other made out of rubber and cloth, but no milk, and described as a “mother soft, warm, tender, with infinite patience, available twenty-four hours a day, a mother that never scolded her infant or struck her baby in anger” [17]. Some decades later a comedic mini

movie featured *Mom Personal Assistant*, a smart speaker device with the “wisdom, caring and sage advice of a mother” [47]. These ideas present selected and highly idealised maternal functions, scripted into a machine. Such ideations echo historical conceptualizations of the maternal body as a machine [8, 28] that carry complex and problematic issues related to the politics of birth and reproduction [42, 50]. In engineering, the term “mother” is used to describe a machine that makes smaller machines [59] and there is a brand of machines dispensing snacks called *Mother* [60], thus reinforcing,

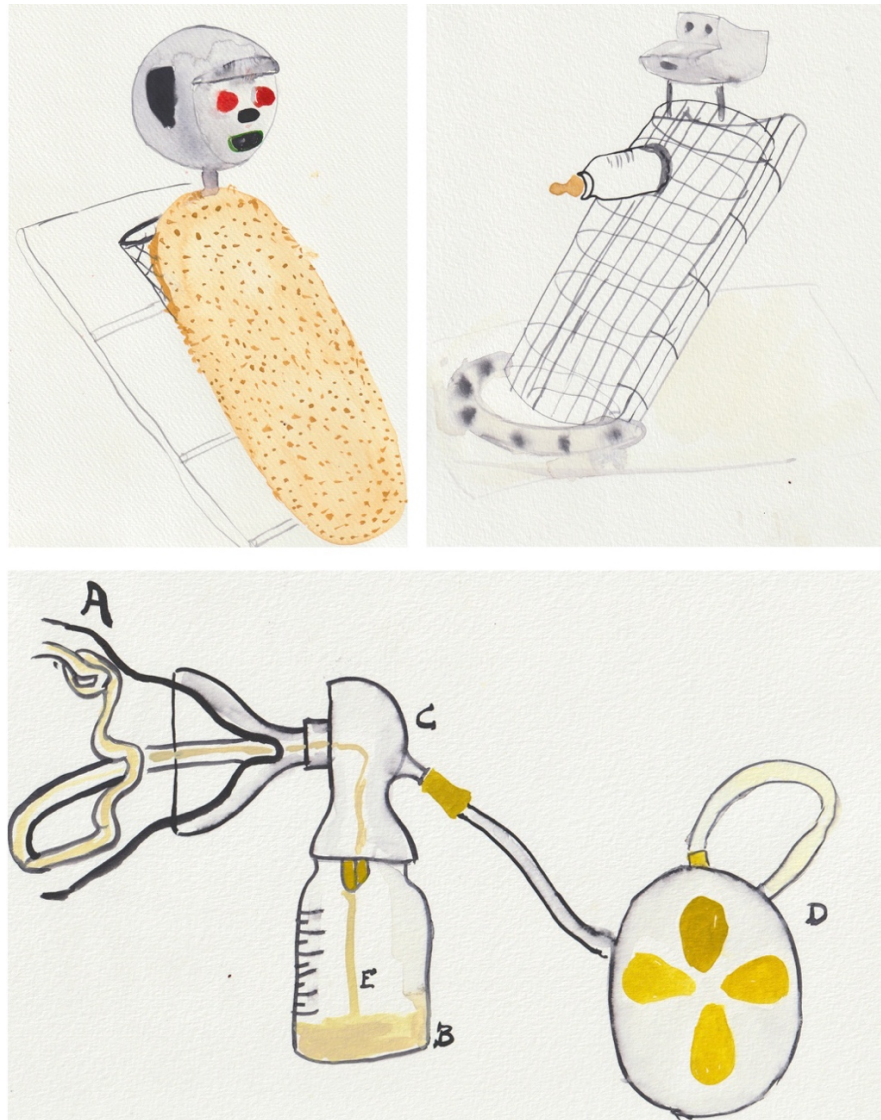


Figure 6: Drawing of Harlow et al's wire and felt mother dolls [17]. These designs indicate how the maternal was understood and reproduced through design, featuring two main functions: nourishment and tactile interaction, in this case presented as separate. Bottom: drawing of breastfeeding pump.

through language, associations of mothers as reproductive or care-giving machines. When humanoid robot Sophia publicly declared that it wants to have a baby [61], the result was a performance of dominant gender stereotypes. As with other demonstrations of new technologies, pre-existing tropes were used to introduce them into public acceptance, arranging humanoid robots to display stereotypical human-like behaviours [37]. Historically, conceptualizations of mother as machine have been impacted by intersectional issues not only of gender, but also of race and class. For example, during slavery in Brazil, enslaved mothers were often rented out as wet nurses for elite families, facilitating an additional exploitation of their bodies by selling their milk as a commodity [38].

Understandings of the maternal body as a biological machine, with idealised notions about how it *should function* can also impact on the experiences of new parents. Mothers who conceptualise breastfeeding as an inseparable aspect of motherhood and see breasts as natural milk-making machines can experience feelings of failure when breastfeeding is difficult or not possible [40]. Experiences with breast pumps are complex because they involve quantification in a realm that is deeply sensitive and subjective. Some mothers report that breast pumps measurements of their milk supply produce feelings of inadequacy [52], with expectations to perform to imagined standards, potentially producing negative effects. Other forms of bodily knowledge are also important in breastfeeding experiences, for example knowing when a breast

feels full or heavy, when it leaks, or how fast milk flows to satiate an infant's hunger. Numerical and non-numerical ways of measuring coexist and are often integrated.

MONITORING TECHNOLOGIES

There are a number of consumer products for the monitoring babies' movements, sound, sleep, blood oxygen, temperature, facial expressions or weight gain [62], [64], [66], and AI powered strollers presented as "Co-pilot Parent Assistant System" [65]. Attitudes towards technological interventions are complex and ambivalent: technology for some can be seen as in conflict with ideals of care, natural parenting or instinctive knowledge [4], [14], [53], [54]. Whilst they can represent safety, efficiency and reliance (echoing earlier ideas about machines providing more trustworthy care than humans), monitoring babies can also invite obsessive checking behaviours [16, p. 33] for parents prone to anxiety. Many monitors are designed to invite a physical distance from the baby, discouraging the use of senses such as touch or direct hearing that might require close proximity [16]. Often expensive, such technologies are seen as symbols of status and privilege [21, 46] and often present an experience of parenthood that is medicalised, full of worry and predominantly infant centred. Marketed with appealing promises of piece-of-mind and security, monitoring technologies capitalise on parental anxieties in experiences that in reality are often difficult to control or predict [16, p. 67]. Furthermore, presenting such machines as more objective or reliable than humans can attribute to them more observational powers than they may have, and undermine sensorial forms of knowing in new parents, at a time of particular vulnerability and ongoing learning.

Monitoring is also extended towards parents or carers through nanny cameras, pregnancy monitoring [31] or for the detection of post-partum depression through chatbots or face recognition apps [45, 62]. Postpartum monitoring through facial recognition raises questions about who determines how emotions are normatively manifested in facial expressions [35] and whether mothers might choose to smile to the camera to mask difficult feelings, given the stigma attached to postpartum depression. Narratives around technologies for new parents could also be challenged to also include ludic or pleasurable approaches, beyond medicalised perspectives and in a diversity of scenarios. The experience of parenthood includes a wide range of ways of knowing that go beyond quantifiable data to be monitored, and that is ancestral, culture and context dependent, non-numerical and sensorial.

MULTIPLE FORMS OF KNOWLEDGE

Many technologies can monitor patterns of temperature, breathing, heart rate, growth rate, sleep, frequency of feeds, weight, size. Such interventions represent a medicalised portrayal of parenthood that can be comforting for many parents or carers, but that coexists with non-numerical forms of bodily knowledge. Artefacts such as breastfeeding pumps can quantify the volume of breast milk produced, but quantification can produce expectations to perform to imagined standards. Other non-numerical forms of bodily knowledge that rely on touch, texture, smell or colour are also forms of measuring, albeit non-numerical. Touch in particular can play a

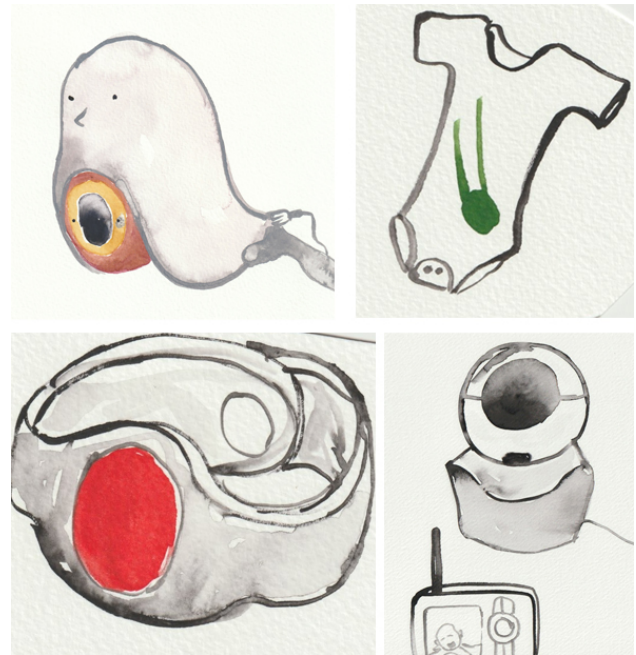


Figure 7: Drawings of monitoring technologies: camera baby monitors, wearable monitors of breathing, temperature, sleep pattern, heart rate and temperature.

significant role in wellbeing, supporting both self and infant health-care. For instance, one way to judge whether a person is suffering from mastitis is to check if the breast feels painful to the touch, or hot or hard. Skin-to-skin contact can be beneficial for both parents and babies [5, 12, 34], it can help with bonding, encourage feeding, reduce stress, regulate heart rate, breathing and temperature and release oxytocin. Sensorial forms of knowledge are often subjective, instinctive, ancestral and culturally situated, anecdotal and passed down from older to younger generations. Parents learn to navigate diverse types of advice and information together with the guidance they receive from medical professionals. This form of knowledge navigation becomes more complex for migrant parents, who might encounter differences in cultural practices of care.

PARENTS AS INNOVATORS

One of the first things that new parents learn is that there is no replicability in the methods involved in caring for an infant. What might work to put a baby to sleep one day may fail another day even when the conditions are the same. Infants are constantly changing and so do the practices and approaches needed in looking after them, they are not puzzles to be solved and situations of care for them have the complex qualities of what Buchanan [9] defines as wicked problems. Reviews for smart cots with motion and 'womb-like calming sounds' to put babies to sleep report that such devices sometimes work, for some babies [67]. Many parents are natural innovators and often adapt existing designs and technologies, creatively and briefly transforming domestic appliances into machines used for care. Examples of this can be seen in the use of patting fish (originally designed as cat toys), that are gently



Figure 8: Drawing of patting fish (cat toy), used by some parents to help put babies to sleep.

attached to the back of a sleeping baby to reassure them through its repetitive patting movement [68]. Other examples include the use of hairdryers, fans or food processors to produce noise or repetitive movements to soothe an infant.

USING DRAWING TO IMAGINE WITH OTHERS

Historical and contemporary ideations about machines for maternal and infant care can reflect the situated perspectives of those who imagined them. Given the increasing entanglement of artificially intelligent systems in situations of care, what are the current ways in which we might imagine machines in this research space? A series of workshops and activities aimed to interrogate and collectively imagine technologies for new parents have been organised as part of this research. Here, I briefly describe how selected drawings of artefacts, humans and other species were used in various workshops with practitioners and researchers working in maternal and infant health, medical humanities, robotics, AI and ethics, user experience and speculative design (workshops with new parents are to take place next in the research). Participants were invited to create scenarios of interactions between existing or imagined technologies, humans and other species, and to write the kind of dialogues or responses users might have with them. The drawings were particularly useful in encouraging participants who might not feel confident with drawing, to visually describe situations. The ambiguity of the drawn artefacts facilitated multiple interpretations of their functions and interactions, and participants were encouraged to consider merging drawn artefacts to create hybrids (for example a camera and a pram), to imagine that artefacts could speak or produce sounds, and that they might offer affordances to various users (parents and carers, babies, pets, etc.). Imagined scenarios were then discussed in group. Not all participants had experienced becoming parents or carers, but all were able to create imagined

situations with technologies. Of those who were parents, imagined scenarios were often informed by their own personal experiences, and technologies were sometimes described as necessary but not always trusted, reflecting an ambivalence towards the presence of technology in this space [53, 54]. Imagined scenarios with such participants often merged care for infants and care for the parent or carer as one.

Imagined scenarios where nappies could be scanned or where artefacts could help diffuse family tensions, alleviate tiredness or manage the participation of remote family members were collectively discussed, and the knowledge from practitioners involved in maternal health and health visiting was particularly informative. The workshops set a proliferation of questions. From early incubators to AI cots or prams, narratives in designs and technologies for infant and maternal care often present machines as more objective and reliable than humans. This can undermine many parents at a time of vulnerability, when not knowing and learning to trust their own abilities for care is key. Can designs and technologies better support new parents and carers through an engagement with uncertainty and multiple ways of knowing as common experiences? What are the ethical implications in such ideations? How could such technologies be more inclusive of the complex diversities in experiences of care? These and new questions will continue to be explored in this research-through-design project, with aims to share them through future publications and other forms of dissemination.

CONCLUSION

In this paper I have described how I used drawing to critically navigate themes in the research space of the project *Maternal Machines: Design Speculations about Fantasies of Care* [57], and to visually and collectively explore imagined scenarios with technologies related to maternal and infant care. These activities, which form part of



Figure 9: Using drawings to discuss and imagine with others.
Photo credit: Katie Harris

the initial stages of this four-year long research project have been useful for identifying topics to be explored through design in this research. Whilst only a selection of themes is presented here, and more themes are likely to be identified further along the project, these mixed activities have been useful in helping delineate the various and complex issues related to ways in which technologies related to maternal and infant care are conceptualised. Fantasies of care reflect social dreams about how we would like technologies to look after us. Studying the imagined scenarios in this space – both historical and current – also enabled a more critical look at concepts of possible designs that I already had in mind at the start of this research, and the workshops encouraged me to revisit them. As is the case of most imagined scenarios, ideas are often naïve and full of yearning yet also full of possibilities and limitations.

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