

Felt Ethics: Cultivating Ethical Sensibility in Design Practice

Rachael Garrett

rachaelg@kth.se

Media Technology and Interaction
Design, KTH Royal Institute of
Technology
Stockholm, Sweden

Kristina Popova

kpopova@kth.se

Media Technology and Interaction
Design, KTH Royal Institute of
Technology
Stockholm, Sweden

Claudia Núñez-Pacheco

claudia2@kth.se

Media Technology and Interaction
Design, KTH Royal Institute of
Technology
Stockholm, Sweden

Thórhildur Ásgeirsdóttir

tasg@kth.se

Media Technology and Interaction
Design, KTH Royal Institute of
Technology
Stockholm, Sweden

Airi Lampinen

airi@dsv.su.se

Department of Computer and Systems
Sciences, Stockholm University
Stockholm, Sweden

Kristina Höök

khook@kth.se

Media Technology and Interaction
Design, KTH Royal Institute of
Technology
Stockholm, Sweden

ABSTRACT

We theoretically develop the ethical positions implicit in somaesthetic interaction design and, using the case study of a water faucet, illustrate our conceptual understanding of ethical sensibilities in design. We apply four lenses – the felt self, intercorporeal self, socio-cultural and political self, and entangled self – to show how our selves and ethical sensibilities are fundamentally constituted by a socially, materially, and technologically entwined world. Further, we show how ethical sensibilities are cultivated in the practice of somaesthetic interaction design. We contribute *felt ethics* as an approach to cultivating ethical sensibilities in design practice. The felt ethics approach is comprised of (i) a processual cultivation of ethical sensibility through analytical, pragmatic, and practical engagement, (ii) an ongoing critical attentiveness to the limits of our own bodies and lived experiences, and (iii) the rendering visible of our ethical practices as a matter of care.

CCS CONCEPTS

• **Human-centered computing** → **Interaction design theory, concepts and paradigms.**

KEYWORDS

Ethics, Aesthetics, Soma Design, Felt Ethics

ACM Reference Format:

Rachael Garrett, Kristina Popova, Claudia Núñez-Pacheco, Thórhildur Ásgeirsdóttir, Airi Lampinen, and Kristina Höök. 2023. Felt Ethics: Cultivating Ethical Sensibility in Design Practice. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI '23)*, April 23–28, 2023, Hamburg, Germany. ACM, New York, NY, USA, 15 pages. <https://doi.org/10.1145/3544548.3580875>



This work is licensed under a Creative Commons Attribution International 4.0 License.

CHI '23, April 23–28, 2023, Hamburg, Germany

© 2023 Copyright held by the owner/author(s).

ACM ISBN 978-1-4503-9421-5/23/04.

<https://doi.org/10.1145/3544548.3580875>

1 INTRODUCTION

Our knowledge and values play an essential role in human-computer interaction design [46, 81]; imbued with implicit ethical positionalities [9, 112], they drive decision-making processes in design. The ethics "*in the character of the designer*" can be seen as guiding the design process in action [46, 75]. This has motivated calls for designers to foster a greater awareness of their ethical role in design practice and how their own values become inscribed into designed artefacts [46]. These ethical positionalities are integral to the practice of design work. Increasing our awareness of these sensibilities has much to offer design research and education; deepening our understanding of ethics in design epistemology [81]; further developing critical and reflective design practices [10, 30, 87], and better preparing designers to face ethical challenges in their practice [8]. We recognise an extended notion of designer responsibility that acknowledges the ethics and values permeating our practice and, perhaps more fundamentally, those that are ingrained in ourselves [46]. Here, we make visible the implicit ethical positions within our practice of soma design and detail how we engage with our ethical sensibilities in design. We frame the ethics of our practice as *felt ethics*; a somaesthetic approach to cultivating our ethical sensibilities.

Ethical sensibilities concern our sensitivities towards ourselves, others, and situations in which we find ourselves. These sensibilities prompt us to act and guide the actions that we take. They include our ability to recognise if some action is required from us and sensitivity towards how we can respond. Our responses are an enactment of our capacity for ethical sense-making and action-taking – a capacity arising from an appreciation of our nuanced selves and of our interdependent relationships with others. These sensibilities are an aspect of our phenomenological bodies and are enacted in the practice of design. They are at the heart of our aesthetic ideals [112]; they manifest in the actions we take towards each other [80]; they influence our design practices [69, 110]; and they shape the knowledge [96] and technologies [108] that we generate through the design process. Much like aesthetic sensibilities, our ethical sensibilities are not static. Just as our aesthetic sensibilities can be shaped by people [71], artefacts [108], culture [47], and politics [2], our ethical sensibilities are open to being enhanced, confronted,

and even reconstructed. We advocate for attending somatically, critically, and analytically to ethics as they are practiced in the design process, and further, that the underlying ethics of our design practice should be made visible and open to challenge and critique.

Here, we develop the theory and practice of *felt ethics*. First, we unpack the epistemological and philosophical foundations of soma design to expose the ethical positions at the core of our practice. Next, we exemplify our ethical positioning through the case study of a water faucet, an artefact created through a soma design process that allows users to somatically appreciate the flow of water. Using this case study, we theoretically develop the concept of ethical sensibilities and how our somas and sensibilities are shaped by factors such as technologies, society, culture, and politics. We show how felt ethics are practiced in soma design; how our methodological approach allows us to engage and develop our ethical sensibilities. Through somatic sensitization, we become aware of our ourselves, others, and our surroundings; through disrupting our normative and habitual ways of living, we confront discomfort that exposes the boundaries of our ethical sensibilities; and through encounters with materials and technologies, we can attend to ethics as they are entangled in our design materials. Once exposed, we can cultivate or remake our ingrained sensibilities. However, we further argue for approaching this process through an ethics of care [27]; a caring and critical attentiveness to the boundaries of our bodies and lived experiences, our positionalities and values, and the ultimate limitations of our practice. To purposefully engage with the limits of our practice, our ethical positions must be made visible as a matter of care. Collective discussion, critique, and challenge of our ethical practices also play a role in cultivating ethical sensibility and are, therefore, vital to a caring design practice.

We follow others who have contributed to finer-grained understanding of ethics in design practice: Munteanu and colleagues call for the refinement of existing ethical guidelines to better address the situational research concerns arising in contexts such as field studies and ethnographic observations [74]. Frauenberger and colleagues propose In-Action Ethics as a novel framework to help deal with these nuanced ethical concerns that arise from conducting HCI research in the wild [41]. Spiel and colleagues further show how their team encountered ethically challenging situations when conducting participatory design workshops with neurodiverse and visually impaired children and draw attention to how overarching ethical frameworks that apply to vulnerable children often failed to address these challenges [93]. They argue their micro-ethical practices employed to address these challenges have potentially far-reaching implications for participatory design practice [93]. However, we see the implicit ethics underlying our design practice as also being relevant to how we practice design in general, not only for conducting research ‘in the wild’. Balaam and colleagues call for the emotional labour undertaken by designers and practitioners to be made visible and published for discussion, to better inform our design processes and train new designers on how to deal with emotionally challenging practices [8]. Helms, through speculative performances of ethics, makes visible the discomforts, doubts, hesitations, and vulnerabilities at the core of her design practice [53]. Eriksson and colleagues analyze ethics as they unfold during the design process of aerial drones to be deployed on the opera stage, revealing a nuanced picture of risk and empathy at the

core of creative expressivity [32, 33]. Finally, Popova and colleagues develop the idea that purposeful vulnerability is an ethical stance in soma design that helps probe the boundaries of what can and should be designed [80]. They further show how ethics are enacted throughout their design process facilitating creative exploration and recovering from breakdowns in their practice [80].

We contribute *felt ethics* as an approach for engaging with our ethical sensibilities. This contribution is comprised of two parts; the theoretical development of ethical sensibilities and the articulation of felt ethics as our approach to cultivating these sensibilities through design practice. We present the felt ethics approach as being of particular interest to designers and practitioners who work with body-focused design methods, and we expect the felt ethics approach to resonate most strongly with those practices [56]. However, a felt ethics is not a method in and of itself, rather our approach is intended to compliment existing design methods, lending an ethical intentionality to practicing design with explicit focus on how ethical sensibilities shape our process and how they can be cultivated. Therefore, we argue that our approach may also be of interest to a wider audience of practitioners exploring the underlying ethics of their work and advocate that others should attend to the implicit ethics of their practices [8, 46, 93], and the value-ladenness of their design work, in ways that resonate with their specific methodological approach. Ultimately, a felt ethics is not intended to be a ‘road map’ towards more ethical practice, but rather to denote an attitude of ethical intentionality and critical engagement towards the complex ways ethics and values are entangled in our practice. It is our goal, then, that our work may prompt other designers, if not to engage with their work in more somatic ways, to reflect more deeply on ethical sensibilities as they are enacted in their own design practice and in relation to their own technologies.

We are motivated by the need to attend to the ethics that we practice. Our processes of somatic cultivation need to be rendered visible for the purposes of encouraging greater honesty in research reporting and inviting critical reflection on ethics and values that, while undeclared, may go unchallenged. A felt ethics approach does not seek to imply a simple or straightforward process nor does it seek to reduce complex challenges by implying that we could simply cultivate enough sensibility to overcome them. However, to make progress in a technological landscape of wicked problems – a landscape that defies overarching solutions or total moral judgements – there is a need to attend to the ethics we practice in our day-to-day design work. We argue for designers to be attentive to how they cultivate and practice their ethical sensibilities, in order to make processual steps towards ethical intention and reflection in the face of the complicated global issues faced by the HCI community at large.

2 ETHICS IN SOMA DESIGN

First, we render visible the underlying ethics of soma design. These ethical positions arise from both its non-dualistic epistemology and somaesthetic philosophy. A non-dualistic body inherently challenges many normative, rationalist approaches to ethics; approaches which generally value reason over emotion. The dichotomy between reason and emotion – and the dichotomy between ethics

and aesthetics in design – are both extensions of the mind/body dichotomy which soma design fundamentally rejects. Subsequently, the aesthetic ideals of the soma design project can also be regarded as ethical positions.

2.1 Soma Design: A Non-Dualistic Stance

Soma design is a design stance that focuses on lived, corporeal experience as a method of designing interactive experiences [57]. This approach emerged as a response to our changing technological landscape, where ubiquitous and pervasive technologies increasingly engage our bodies in more corporeal – and intimate – forms of interaction [57]. Soma design draws on the philosophy of somaesthetics [90, 91], to serve as a practical means of generating insights and cultivating experiential skills that aid in the design of interactions that provide more rewarding, pleasurable, or fulfilling interactions [57]. Somaesthetics emphasises a three-fold approach to bodily cultivation through analytical, pragmatic, and practical engagement [91]; a continuous cycle of analysing/reflecting on practice, seeking methods to improve practice, and cultivating improved practices that resonate with the iterative, reflective, and epistemologically diverse nature of design practice [35, 70, 85].

Soma design explicitly places the subjective, pulsating, and moving body at the centre of the design process [57], and involves designers actively attuning themselves to their bodies and senses [62]; a process of cultivation that crystallises in the design outcome [96]. Soma design is a fundamentally non-dualistic design stance [58], placing emphasis on the movements of the body as the primary means by which the body creates and conveys meaning [72]. Movement, in this case, refer simultaneously to the kinetic, moving body [89], the felt-sensing body and inner shifts within ourselves, as well as the sensations mobilised by attuning to experiences [42]. In recent years, soma design has reached a point of maturity where the rigour and generativity of soma design to interaction design research is established [96]. Sensitizing oneself to one's movements exposes tacit knowledge [79]. Making this tacit knowledge palpable or visible allows designers to engage – whether through materials, methods, or reflection – with knowledge and experiences that might otherwise remain unnoticed. This has been shown to provide richer, generative insights into the aesthetic potential of interactive design materials [62]; the transformative qualities of design [94]; ethics and values at play in the design space [32, 33, 80]; and the politics and non-neutrality of bodies [60].

As such, soma designers do not view 'knowing' (the rational) as being separate from 'feeling' (the emotional). As this is a distinction often made in Western ethical frameworks, the non-dualistic core of the soma design [58] can be seen as pushing back against the dichotomy between reason and emotion in ethical thinking. Ethics are, as such, not solely a matter of intellectual conviction. Damasio discusses the case of rehabilitation with patients who suffered brain injuries [26]. Although they knew 'logically' the difference between right and wrong action, the damage impaired their capacity for emotional regulation and, consequently, their ability to put their ethical knowledge into practice. Shusterman offers a different illustration of the centrality of our sensory engagement in ethics, arguing that complex social problems such as racism cannot be challenged by reasoning alone, as animosity against the other is grounded in

bodily discomfort [91]. These examples show how understanding ethics as a sole compilation of 'reasoned' decision-making ignores the fundamental role of emotion – part of our corporeal reality – in the practice and sense-making of ethics. This echoes Varela, who criticised Western thought on ethics as focusing on moral intentionality as separated from action [106]. His enactive view places ethical action as being closer to a somatic than a strategic responsiveness. Proponents of a feminist ethics of care have also pointed to how a traditionally dualistic view of rationality and emotion – where emotional labour is seen to be of less ethical import than rational concerns over autonomy, sovereignty, and legislation – have fostered a society where many ethical concerns are minimised and rendered invisible [104]. A non-dualistic view of reason and emotion then shifts the conceptualisation from an ethics grounded in utility towards a morality grounded in care [11], which implies that moral concerns are closely related to the situated and contextual needs of others [102]. This requires designers to cultivate their somatic sensibility and, by extension, an increased receptivity towards our environment and the needs of others [88]. Soma designers have described this ethical dimension of their practice as fundamental to the outcomes of soma design [33, 80], identifying how ethics are enacted at the heart of soma design [32], and how designers need to openly welcome, but also care for each other during, ethically-challenging situations [80].

2.2 Ethics and Aesthetics

As an extension of rejecting the rationality/emotion dichotomy, soma design also rejects a similar dichotomy between ethics and aesthetics. Having permeated the Western intellectual tradition during the Enlightenment [21], this dichotomy differentiates between ethics (or the rational mind) as concerned with reasoned objectivity informing our moral judgement, and aesthetics (or the emotional body) as concerned with subjective opinions and base desires of beauty or pleasurable experience. Soma design bears a strong set of aesthetics ideals that may serve to guide design work, such as slowness, compassion, and appreciation [57]. Given the argument that rationality and emotion are a false dichotomy when it comes to ethical action [26], we need to consider in-depth the relationship between ethics and aesthetics in soma design.

Wittgenstein regards aesthetics as a subject misunderstood [112, p.1], mainly that issues relating to aesthetics are not limited to those of the artistic, but instead counterpart to many other philosophical enquires – including ethics. Wittgenstein goes so far as to say that ethics and aesthetic are one [113, 6.421] – or that ethical life is the reward of aesthetic value [101, p.65]. In essence, both aesthetics and ethics can be viewed as interrelated approaches to the philosophical question of how to live; ethics as reflecting a view of world and value of life, and aesthetics the means by which we can best live according to these values [101, p.65]. Wittgenstein indicates that the dualism between rationality and emotion is often hidden under an aesthetic guise [49]. Critical reasoning (the mind) is not separate from aesthetics (the matter). Wittgenstein not only viewed aesthetics and ethics as two interrelated aspects of the same philosophical enquiry, but also considered that the value of both could not be explained by purely symbolic or linguistic propositions. In other

words, neither aesthetics, ethics, nor values can be separated from their material reality.

Similarly, Dewey argues that critical inquiry based in abstract, generalised knowledge divorced from feelings or aspirations is insufficient to make sense of many aspects of the world [6]. He sees the critical and aesthetic as interrelated aspects of the same approach to the question of how to live – aesthetics to enhance our capacity for meaningful experience, and criticism to inform how we consider meaningful experience and how to approach it through the aesthetics of living [28]. Here, Dewey describes a process that characterises the development of an aesthetic appreciation toward how we can have rich, meaningful experiences. It is important to note here, that Dewey describes a continuous process – one with no identifiable end – as to end this process risks the stagnation of our values. Dewey warns that we risk stifling progress if we do not seek to constantly develop our aesthetic repertoire [29]. Returning to Wittgenstein's characterisation of the aesthetic as how ethical value is expressed, we then also risk stifling our ethical progress. In this way, we risk becoming unprepared to properly engage with either aesthetic or ethical values when we encounter them in design practice.

The somaesthetic project – and by extension soma design practice – can be regarded as synthesizing these positions, grounding aesthetics, ethics, and values in an even more radical conception of the non-dualistic body – a corporeal reality that is the foundation of symbolic aesthetic or ethical prepositions [88]. It is to this corporeal reality that we must also attend if we are to be prepared to make aesthetic or ethical judgements about what experiences we should design. Shusterman, building on Dewey's aesthetics, describes this as a meliorative process of cultivating aesthetic and ethical sensibility as rooted in the body, and therefore, the process of cultivating these sensibilities becomes a matter of deep somatic engagement [90]. The implications of this for the soma design approach are clear; the aesthetic ideals that characterise the soma design approach (e.g., *The Soma Design Manifesto* [57]) do not only concern the aesthetic, for the aesthetic is a demonstration of an ethical position, a position that expresses a certain view of the world and what we believe should hold value in that world. This framing of the relationship between ethics and aesthetics can also be used to reveal that soma design, an ideal-driven practice, holds an implicit set of ethical positions at the heart of its aesthetic values. These positions are a manifestation of our ethical sensibilities, sensibilities that we engage with and change through the practice of a felt ethics. For our sensibilities do not and should not remain static; they necessitate an ongoing critical, somatic engagement or else our capacity to exercise our aesthetic or ethical sensibility may stagnate. Attending to our somatic experiences may reveal harmful societal nor political norms, enacted on or through our bodies, that can be subverted and changed. However, the subtle shifts of our somatic experiences can also foster an nuanced appreciation of our ethical selves, and how our ethical selves are revealed through our changing bodies, the different contexts in which we are situated, and the different people with whom we are surrounded. Somaesthetic practices allow us to notice our ways of living that may have become habituated, ingrained, and tacit, and offers a meliorative approach to improve these ways of living.

3 CASE STUDY: SOMAESTHETIC WATER FAUCET

Our main aim is to develop the concept of ethical sensibilities theoretically and analytically. To illustrate and ground our ideas empirically, we present the case study of a water faucet. This artefact emerged from a two-month somaesthetic design process intended to explore our relationship to resources and energy systems, culminating in a somaesthetic redesign of a water faucet intended to foster a somatic appreciation towards the availability of the water we use in our homes [7]. In this section, we briefly describe the design process and the artefact itself. In the section that follows, we then unpack the case study in more detail, layer-by-layer, to reveal different lenses that we can turn upon our ethical sensibilities, both to explain the different ways that our sensibilities are shaped and offer insights into how they can be engaged.

The first stage of this design process involved Thórhildur (henceforth Thorie), an interaction designer, sensitizing herself to the energy she used in her home. Through conducting an autoethnographic study [1] of her energy consumption, she attended to her habitual ways of consuming energy, but quickly discovered that constantly being subject to her own critical gaze led her to become obsessive – prioritising the restriction of her energy usage at any cost and inevitability experiencing guilt and frustration whenever she failed to embody the 'perfect ideal' of sustainable consumption. Gradually, Thorie's guilt subsided. After experiencing that it is difficult to treat sustainability as a binary issue of acting sustainably or not, she instead became curious about the different textures of the energy she used. Thorie then employed soma design as an approach to sensitize herself in more nuanced ways to her energy consumption. Her focus narrowed to her kitchen; the nexus of different energies – heat, electricity, water – in her home that she encounters multiple times a day. She engaged in somatic sensitization methods such as a slow walk [105], adapted to the context of the kitchen, that allowed her to experience her kitchen routines in a new, unfamiliar way. She became more attentive, noticing the residual heat from her morning cup of coffee hours after the coffee had been brewed, and more appreciative of the textures and materialities of the different energies flowing around her kitchen. As her exploration continued, Thorie's focus slowly narrowed to water as a resource with an evocative materiality that she consumed.

Thorie invited two others to individually participate in two co-design workshops exploring water usage. During one of these workshops, Thorie observed Eliza, one of her participants, washing dishes in her kitchen. She noticed how little water Eliza used, instead using her hands to cleverly direct the low-pressure stream of water from the faucet into all the corners and crevices of the dishes. Thorie asked Eliza to explore this further using an aesthetic lab (A-Lab) [3], a method to perform interactions together, to explore participants' aesthetic experiences and reactions, as well as to invoke playful and rich dialogue [57]. In the A-Lab, Thorie closed her eyes and invited Eliza to guide her through the experience of washing dishes. Eliza gently guided Thorie's hand to the faucet and allowed her to open it. However, Thorie did not realise that she loosened the faucet too much and released an overly strong stream of water, enough to potentially splash from the dishes beyond the edge of the sink. This discomforted Eliza, and she took control of

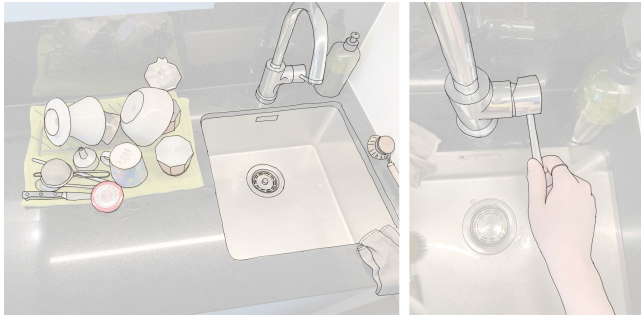


Figure 1: The Water Faucet. On the left, the water faucet and sink are shown next to clean dishes. On the right, Thorie opens the faucet with her hand. The faucet is opened by pushing a lever which releases the flow of water.

the interaction and tightened the faucet. Later, when Eliza reflected on this moment, Thorie realised that she had been unaware of the strength of the water flowing from the faucet. However, she also recognised this moment had prompted Eliza to exert control and act with care towards both Thorie and their water consumption. From this experience, Thorie designed a speculative water faucet that is opened with a tension tied to the strain that is being put upon the local reservoir; the faucet opens easily when water is plentiful or in low-demand, however if the reservoir is low or under pressure, the faucet becomes taut, requiring more strength to open and conveying the ‘pull’ or ‘strain’ being put on the water supply. When reflecting on the faucet, Thorie expressed that she did not want to create a design intervention that forced people to adapt to sustainable behaviour by imposing constraint and potentially fostering discomfort and resentment. Instead, the shifting tension/looseness of the faucet is intended to act as a prompt to take greater care and appreciate that water is a shared resource. However, the artefact allows for the subjective agency of the individual to lead the interaction.

4 PRACTICING FELT ETHICS: CULTIVATING ETHICAL SENSIBILITY

This section outlines the first dimension of practicing felt ethics; that of a *processual cultivation of ethical sensibility through analytical, pragmatic, and practical engagement*. We define ethical sensibilities as concerning our sensitivities towards ourselves, others, and situations in which we find ourselves. These sensibilities prompt us to act and guide the actions that we take. They include our ability to recognise if some action is required from us and our sensitivity towards how we can respond. Our responses are an enactment of our capacity for ethical sense-making and action-taking – a capacity arising from an appreciation of our nuanced selves and of our interdependent relationship with others. Though we see the many dimensions of our ethical sensibilities as being complex and inseparable, we present them here through the four lenses of (i) the felt self, (ii) the intercorporeal self, (iii) the socio-cultural and political self, and (iv) the entangled self. We chose these lenses to illustrate ethical facets of soma design pertinent to our own design practice. Beginning with the self that sits at core of soma design, we

apply each successive lens to enable a shift from an isolated “inner” self toward a conception of self that encompasses dimensions of the “outer” world; to others; to society, culture, and politics; and to a materially and technologically entangled world. To elucidate the perspective revealed by each lens, we unpack a different layer of the case study and use it to theoretically develop our ethical sensibilities and how we might engage with them.

Thorie’s methodology is characterised by the three-fold approach to somaesthetic cultivation which we can extend to practising felt ethics – i.e., cultivating our ethical sensibilities. Thorie sensitized herself to a specific ethical sensibility – her energy consumption – and the process of cultivating this sensibility simultaneously shaped herself, her relationships to others, her design process, and eventually crystallised in an artefact that exemplified her sensibility in its design. The three aspects of the somaesthetic approach – the analytical, pragmatic, and practical – are inseparable for they are rooted in the view of the body as a non-dualistic whole [91]. In soma design, each of these aspects are often framed in relation to cultivating our aesthetic sensibilities. Here, we instead frame them in terms of their relation to our ethical sensibilities. The *analytical* engagement in a felt ethics involves the descriptive and theoretical explanations of our ethical practices and the role a felt ethics plays in our bodily perceptions, design practices, and knowledge production. The *pragmatic* engagement of a felt ethics involves developing specific methods for cultivating ethical sensibilities, attending to how existing methods shape our ethical sensibilities, and engaging in their assessment and critique. Finally, *practical* engagement with a felt ethics involves the actual somatic engagement with the bodily practices that shape our ethical sensibilities. Thorie’s process consisted of analysing and critiquing her energy usage, pragmatically seeking methods (autoethnography, slow walking, A-Labs) that would enable her to improve her practices, and finally, practically engaging in her chosen methods intended to improve her somatic sensibility towards her consumption. This process of somatic cultivation allowed Thorie to foster a greater appreciation of her ethical sensibility towards energy consumption before cultivating that sensibility in a more sustainable direction.

4.1 The Felt Self

The first lens illustrates how Thorie engaged with her *felt self* at the core of her design practice and how this, in turn, allowed her to cultivate her ethical sensibilities. In soma design practice, aesthetic sensibilities are developed through the process we have just described; practical engagement blended with analysis, reflection, and critique that each serve to develop the others. As ethics and aesthetics can be regarded as reciprocal, we can treat the cultivation of ethical sensibility in a like manner. Soma design advocates for, and its methods foreground, a deep engagement with oneself; a heightened attentiveness to bodily signs and signals [95], movements and muscles [61], changes to our bodies [99], shifts of interest [68], new experiences [67], and engaging with the non-habitual or even uncomfortable [14, 110]. Attending to these felt experiences helps us understand our somatic responsivity – how we are engaged, enthralled, or even repulsed by certain experiences – rendering an aesthetic appreciation that we then draw upon in design work. Much like the slow development of an aesthetic appreciation [62],

cultivating an ethical sensibility is a processual form of ethics [42], less concerned with abstract moral imperatives, but instead focused on a processual manner of cultivating our capacity to act ethically as manifested in the situated decisions we make throughout the design process. This is reflected in somaesthetic philosophy which says; "*Attention to bodily feelings cannot explain our thinking, our emotions, or our will. But it can improve them. Somaesthetic sensations neither explain nor justify our aesthetic judgments, but they can help us enhance our aesthetic capacities and even our ethical powers*" [90, p.134]. This is because soma design methods allow designers to traverse the dichotomies between *inside and outside, individual and social, and body and technology* [58].

Traversing these dichotomies, attending to our bodily signs and signals, moments of pleasure and discomfort, allows us to *feel ethics* – our somatic responses and ways of being that reveal our ethical sensitivities and sensibilities; whether we act or behave in accordance with certain expectations, whether our values or biases are reinforced or contested, whether our norms and habits are confirmed or challenged, or whether our encounters align with what we expect, or instead we are faced with something new. This can help us gain a greater understanding of our ethical sensibilities and even reveal those ingrained so deeply that we are not yet aware of them. Feeling ethics entails attending to many different kinds of experiences to gain both aesthetic and ethical understanding of the technologies we could design. Experiences that provoke discomfort, anger, or irritation can provoke our ethical sensibilities, but equally, joyful, comforting, and fulfilling experiences can help guide generative design work. Both of these can serve to help designers envision future possibilities for interaction [70]. Through somatic engagement, we can enhance and even remake our ethical sensibilities through reflection, analysis, and critique of our first person lived experiences. Somaesthetic cultivation is, not only a means of improving our physical capabilities and our aesthetic capacity for fulfilling experiences, but also of enhancing our capacity to act ethically towards others. This is, in part, because we can cultivate a greater capacity for empathy and compassion but also because "*bodily rigidities and blockages are often both the product and a reinforcing support of social intolerance and political oppression*" [92, p.153].

Thorie's process of cultivation is characterised by an ongoing process of becoming – somatic sensitization, becoming aware, becoming discomforted, and then re-sensitizing her somatic sensibility. Somaesthetic cultivation can be a difficult, even painful, process [90]. Each part of this process challenged Thorie in different ways; *sensitizing herself* led to stress and anxiety over her energy usage and emotional difficulty resulting from the perceived failure to live up to her own ideals; *becoming aware* provoked moments of unfamiliarity triggered by her newfound sensitivity towards energy usage (such as the residual heat of her morning coffee) and noticing the fine-grained ways in which Eliza used water; *becoming discomforted* when Eliza's different sensitivity to water consumption challenged her own; and then *re-sensitizing herself*, with Eliza's aid, to a more sustainable way of engaging with water. Each of these moments in her process remade her relationship to energy and water, but each also remade her relationship to herself, shifting from being critical of her perceived failure to consume sustainably toward a gentler relationship of care and curiosity. Though the

process challenged her, Thorie also found joy and connection in the experience of washing dishes with Eliza. These experiences became the aesthetic foundation of her design, marking what was precious to her in the experience, and leading her to emulate the moments of care and invitation in the interaction with the faucet. This engagement with and cultivation of the designer's *felt self* is the core of soma design practice. We now apply the other lenses in turn, to reveal how the self is fundamentally relational and co-constituted, and by extension, how specific soma design practices allow us to practically engage with these dimensions of our ethical sensibilities.

4.2 The Intercorporeal Self

The second lens highlights our *intercorporeal self*; our capacity for ethical sensitivity, the role of others in shaping our ethical sensibilities, and a relational conception of morality. Intercorporeality refers to our capacity to relate ethically towards each other, and how this capacity arises from the intercorporeal relationships between bodies. This is seen in Thorie's sensitivity towards Eliza's movements while washing the dishes and her capacity to understand their meaning and value. Thorie's design work also demonstrates a relational morality; a morality that foregrounds a contextual ethical sensibility towards our interdependence with others that can serve to guide, but not determine, moral action. This morality is apparent in the water faucet itself – it guides one to take care when water is scarce but it does not forcibly determine that one should do so. Finally, we discuss the purposeful vulnerability that enables this intercorporeal, relational ethics to manifest in situated ethical decision-making – such as in the interaction between Thorie and Eliza in the A-Lab – which can be attended to within the design process for the purpose of further developing our ethical sensibility and to make the ethics of our practice visible.

Intercorporeality. Intercorporeality holds that communication and meaning-making are situated in the exchange between our lived, corporeal bodies and the surrounding world [73]. Merleau-Ponty describes this as a *chiasm*, a bi-directional exchange between the sensing body and sensed things that give rise to the possibility for communication [71]. This bi-directional exchange happens within the pre-reflexive and pre-conditional space of our bodies, and importantly, it creates the shared corporeal reality and points of reference necessary to communicate and share understanding. This is apparent when Thorie notices the subtle ways in which Eliza uses her body to conserve water. Thorie intercorporeally understands the meaning and value of Eliza's movements based on their shared corporeal reality of conserving water. The intercorporeal relations between bodies constitute our ability to communicate meaning or value. Therefore, our capacity to relate ethically towards one another is also situated within the shared intercorporeal space of our bodies. It is only later that we are able to express or develop our ethical understanding through symbolic rules, moral frameworks, or linguistic prepositions – such as when Thorie speaks and reflects with Eliza on her hand movements. This positioning of meaning-making as corporeal is also reflected in the foundations of soma design. Like Merleau-Ponty, soma design engages with the body as the foundation of how ethical understanding and empathy arises through our shared intercorporeal apprehension of

movement: *"Movement is indeed our match point. That this lingual tactile-kinesthetic sense-making is closely related to empathy strongly suggests that where meaning is corporeally enacted, then intercorporeal sense-making only makes sense"* [89, p.336]. It is to this capacity for ethical sense-making that soma design attends through the process of somatic cultivation. Thorie was better able to appreciate Eliza's subtle movements after she herself had cultivated her own sensibility towards energy consumption. Somaesthetic cultivation can therefore be regarded as a returned attention to the *capacity* for ethical sensibility, rather than solely focusing on the symbolic moral expressions that arise *because* of this capacity.

Relational Morality. If we consider our capacity for ethical action as rooted in our relationships with others, then we must also consider relationality in the wider context of morality. In this sense, we can view an ethics based in our intercorporeality in a similar fashion to an ethics of care; a morality that acknowledges the fundamental corporeally-rooted interdependencies between ourselves and others, and an ethical sensibility – developed through practice – that can guide moral action [52]. An ethics of care questions the moral ideal of the fully autonomous and independent agent perpetuated by many normative Western frameworks, pointing out that this conception ignores the corporeal realities of infancy, illness, and old age – realities during which we are fundamentally dependent on others – and also serves to render many of the material realities of our interdependent society (such as labour) invisible [52]. Instead of focusing on morality as an individual's actions judged against the criteria of a moral framework, a care ethic approach argues for a form of collective moral progress by attending to these issues from the perspective of a relational ontology of humanity – an ontology in which humans are not viewed as isolated actors but as beings whose well-being is interdependent with that of others [45]. This attitude is eventually adopted by Thorie, who shifts throughout this process from critically judging her actions against the absolute criterion of using as little energy as possible, towards an attitude of ongoing care regarding her energy consumption and an appreciation of water as a shared resource. A care ethic requires a situational understanding of ethical action rather than the application of absolute moral rules that may ignore the contextual reality of a politically and socially imperfect world [104]. To this end, and in a similar fashion to the somaesthetic approach, a care ethics advocates for a form of ethical sensibility to help inform ethical action, whilst not providing arbitrary conceptions of right or wrong action. This *"analysis of what is necessary to be well and live well in the world can be expressed in terms of sensitizing principles to guide, but not determine, practice"* [11, p.18]. It is practice that characterises a care ethic approach; and care requires an ongoing and critical engagement with the ethics at play in a certain situation. *"Care is not a soft option – the work of making moral judgements about the best thing to do in often difficult circumstances, which could result in harm being caused as well as prevented, requires considerable rigour, strength and understanding"* [11, p.18]. This conception of ongoing judgement is manifest in the design of the water faucet – where the shifting looseness of the faucet prompts an ongoing decision-making process regarding how much water to use, for it is a reminder that water is a shared resource fundamental to our collective well-being.

Engaging with the Intercorporeal Self: Fostering Shared Vulnerability: The practice of cultivating an appreciation of the incorporeal self is best illustrated in the A-Lab, where Thorie and Eliza co-facilitate a shared experience of washing dishes. Guiding someone through the experience of another person in not simply a matter of one participant acting while the other remains passive, for active and passive are too binary distinctions to capture the mutual engagement necessary in either role. Thorie actively chooses to remain passive – purposefully vulnerable – allowing herself to be led, whilst Eliza – purposefully vulnerable – consents to lead Thorie while potentially exposing her practices to scrutiny and critique. Eliza expressed doubt and insecurity over the interaction, concerned her dish-washing practices might not be 'interesting enough' or 'worth revisiting' for Thorie's research. Eliza reflected on her nervousness to make the experience a success and how she had made subtle adjustments to her posture to help best facilitate Thorie's engagement with the faucet. This is an example of *"the fine texture of day-to-day decision-making; the subtle adjustments we make in the continuous flux of communication, in response to our intuitions about the needs of others; the search for personal meaning and clarity about personal goals and relations with others"* [66, p.xviii]. This responsiveness can be viewed as Eliza's ethical-sensibility-in-action, or, to use Varela's term, the practice of her ethical 'know-how' [106]. This is also evident when Thorie opened the faucet with too much strength, and Eliza exerted control over the situation to prevent the water spraying beyond the sink. This moment, although brief, demonstrates Eliza's ethical sensibilities-in-action in a seemingly banal exchange; her sensitivity towards water consumption, her care for Thorie, and her perceived responsibility to ensure that the A-Lab was a successful experience. Popova et al. refer to these fine-grained adjustments as the interaction work that helps enable purposeful vulnerability [80]. Purposeful vulnerability is necessary in soma design work as the process of cultivating aesthetic appreciation might involve discomfort, even risk [33]. However, it is critical for developing our repertoire of experiences which can inform our aesthetic – and ethical – sensibilities. Popova et al. demonstrate that many of the fine-grained decisions that foster this vulnerability are enacted pre-reflexively – an example of our ethical sensibilities-in-action [80]. However, there are formalized soma design methods that also aid in fostering this environment. These include practices such as somatic connoisseurship [84]. These expert practitioners, who share their knowledge of specific somatic practices, also care for participants by guiding the process of engaging in a new practice, ensuring that participants do not suffer injury, and who can help them overcome the difficulties of engaging in an unfamiliar practice. Further, methods such as body maps [23] and trajectories [100] serve to encourage openness by enabling reflection and discussion. These are practical methods that help us articulate, and once articulated, we can share our inner thoughts and feelings, allowing those articulations to be compared, critiqued, and together debate consequences of the design work we are engaging in. As such, fostering vulnerability requires methods that ensure trust, empathy and productive ways of handling ethical intention and reflection.

4.3 The Socio-Cultural and Political Self

The third lens emphasizes the *socio-cultural and political self*. We discuss this in terms of socio-cultural habits and political norms, and then, illustrate how we may engage with these through the disruption and defeminization of our ingrained sensibilities. During her design process, Thorie reflected on how she came to realise her ethical sensibilities were also socio-culturally shaped. Thorie spent half of her life in California, a place which has experienced chronic drought over the past decade. She reflected that she had not realised the extent to which this affected her relationship to water until she engaged herself and others in the design process, sensitising herself to her sensibilities and discussing her experiences with others. She reflected how this shaped her initial approach to controlling her energy use – disciplining herself through short showers, flushing the toilet less frequently, and reusing her dish-washing water for other purposes. The experience of living with a form of scarcity, and having experienced how it feels to be forced to adapt and change to it, also shaped her ethical sensibilities towards others. These experiences strengthened her resolve not to impose a constraints-based sustainable intervention on others; a result of her empathy towards the potential distress caused by being restricted, even if such restriction may have been warranted. Thorie's experience shows how aspects of our ethical sensibilities are socio-culturally and politically constituted, and how we may disrupt our habits, norms, and values to reveal this shaping.

Socio-Cultural Habits. Feminist scholars have long criticized the dichotomy between of our 'natural' body and our 'social or cultural' mind [47]; a symptom of the same dualistic approach which soma design seeks to reject. *"Even if mind cannot exist without body, the mind is regarded as a social, cultural, and historical object, a product of ideology, while the body remains naturalistic, pre-cultural; bodies provide the base, the raw material for the inculcation of and interpellation into ideology but are merely media of communication rather than the object or focus of ideological production/reproduction"* [47, p.17]. Our bodies are disciplined in different ways, and shaped by different social realities. This can be seen in our ingrained habits, such as different ways of walking or eating, different tones of the voice and manners of speaking. While these may appear 'natural', they are trained within society and culture. The manner in which we are trained to walk is socially acquired [64], as are our ingrained expectations of how we should look and dress [31]. The ways in which we are trained to behave – such as our tastes and manners – all reflect our position in the social space [19]. One aspect of this socio-cultural shaping can be seen in Thorie's relationship to water. She initially approached conserving water in the way she was socio-culturally accustomed, restricting and disciplining her consumption. However, the process of consistent engagement with her habitual ways of conserving water led Thorie to appreciate the stress and anxiety caused by disciplining herself towards a potentially unattainable ideal. Thorie then challenged and remade her socio-cultural sensibility into a healthier relationship between herself and her water consumption. This relationship was not forged in discipline and restriction, but rather an empathy to the corporeal reality of needing water and a commitment to progress towards as-best-as-possible [51] sustainable practices.

Political Norms. This also serves to reveal how our bodies are politically disciplined: at the centre of systems of monitoring, punishing, and normalising. Such systems serve to validate certain ways of behaving over others [39]. The forms of bodily disciplining – some blatant, others insidious – are omnipresent in schools, state institutions, and other organisations. They serve to establish the norms of our societies. Such norms in turn help society establish whether we should feel comforted or discomforted by certain practices or ways of life, such as lifestyles outside heteronormativity [38]. This becomes ubiquitous when we are surrounded by technologies that can further marginalise communities, reinforce structural inequalities, or result in further oppression [24] as well as contribute to issues of hidden labour and environmental degradation [25]. These harms are enacted through technologies onto the lived experiences of people who engage with them. *"Power relations and systems of representations not only traverse the body and utilise its energies [...] but - actively constitute the body's very sensations, pleasures – the phenomenology of bodily experience"* [48, p.111]. The disciplining of bodies is part of the history of capitalism; the re-constitution of body into a means of production – a body that should be machine-like and detached [36]. It is also a part of the history of gender with particular emphasis on how women are taught to control their emotions [55]. This results in the cost of challenging the normalised ways of being and feeling: *"in other words, to begin a feminist life is to hear an accusation; it is to hear that others understand you as failing to carry out your duties in the right way"* [2, p.63]. Thorie's design process and artefact can be interpreted politically. Rather than viewing the ethical question of sustainability from a utilitarian perspective (that such discipline is justified for the greater environmental good), the water faucet is instead a subversive speculation that challenges political methods of disciplining bodies and diminishing moral agency on the part of individuals. Thorie sees the path to conserving resources as being a matter of empathy and somatic freedom, designing an artefact that enables others to act with care, responsibility, and accountability.

Engaging with the Socio-Cultural and Political Self: Disrupting Ingrained Habits and Norms: The process of ethical cultivation often involves discomfort evoked through disrupting our habitual or normative ways of being. Soma design practice frequently employs methods that (explicitly or implicitly) foreground estrangement [13, 110] by actively seeking to disrupt a habitual or normative way of moving [57]. Through estrangement we can ask; *"What is done to disrupt the [...] current state of affairs? What physical or conceptual elements are added to or taken away from the body or the action? What is destabilised by this disruption? What norms, traditions, structures, or systems become – conceptually or physically – unstable? What emerges from this destabilisation? What does it bring into awareness?"* [110, p.4]. The moments of discomfort elicited through estrangement are vital to reveal the boundaries of our ethical sensibilities – moments where our sensitivities or pre-conceptions are disrupted and destabilized. This discomfort can challenge us towards ethical growth, prompting us to reflect on ourselves, our ingrained norms, habits, values, motivations, and judgements. As our bodies have been disciplined and shaped in different ways, challenging these disciplines is a 'subversive project' [17] that seeks to remake the boundaries, reconstitute the habitual, rebuild the norms built into

our bodies, and critically examine the disciplines that have shaped our bodies in these ways. The ethical project of soma design is an inherently political enterprise, approaching ethics in bodily and design explorations that seek to question whether our norms and values serve to help or harm ourselves or others.

4.4 The Entangled Self

Finally, the fourth lens underlines the *entangled self*; how our ethical sensibilities can be co-constituted by different, often non-human, agencies. It is through somatic encounters with materials and technologies that we can begin to foster an understanding of these entangled materials, ethics, and agencies. The design process of the water faucet reveals how humans and non-humans are ethically interconnected and mutually transformative; that our ethical sensibilities are inseparable from the designed artefacts and technologies with which we are entangled [40]. Thorie's design process shows that the space of intercorporeality – the shared corporeal space in which our bodies are constituted by others – is not only occupied by human bodies, but also non-human materials and agencies that shape our bodies and actions [73]. It recognizes a more-than-human conception of our corporeal interdependence [56], showing how our ethical sensibilities extend beyond other individuals. The design of the water faucet demonstrates how our ethical sensibility can be both shaped and mediated by non-human agencies such as artefacts and technologies [65].

Transcorporeal Interdependence. The interdependence between us and the non-human world is best described by Alaimo, who recognises what she terms 'transcorporeality'; an extended conception of human corporeality as entangled with, among others, biological systems such as water [4]. Water can be considered one of the primary corporeal interdependencies between us and the non-human world, not simply a resource for our consumption but vital to the survival of all life. New materialists such as Bennett advocate for cultivating the sensibility to recognize these forms of agency – that "*the ability to discern nonhuman vitality, to become perceptually open to it*" [16, p.22] is of primary ethical import. Thorie, by cultivating her ethical sensibility toward her energy consumption, also became more appreciative of the different textures and materialities with which she was entangled. Not only was she more attentive to the physical textures of different energies underlying perceptual experience (wetness or heat), but also of the different kinds of attention given to energy interactions, the ebb and flow of appreciation towards energy use that play a role in fostering meaningful engagement with energy. This relational understanding of our corporeal interdependence with water and sensitivity towards its non-human vitality served in shaping her design process. It is argued that relational and expansive design based on humility and cohabitation [109], one based in the radical interdependence of all beings, is vital to help HCI researchers cultivate decolonial and sustainable practices [34]. A relational understanding of our entangled bodies can also help us in attending to ethics as they unfold or are enacted in situated design practice [32, 80]. Design practice can be viewed as a complex entanglement, involving multiple humans, design materials, artefacts, resources, technological processes, and other infrastructural factors that all shape the design process. Our ethical sensibility and the ethical decisions that are

enacted within the design process are constantly shaped by this assemblage of agencies; Thorie's ethical sensibilities in this process were shaped at the nexus of different energies, technologies, people, and socio-cultural circumstances.

Technological Mediation. This entanglement perspective also reveals how designed artefacts and technologies can be explicitly or implicitly ingrained with ethical qualities or may mediate or shape ethical action [108]. In postphenomenological terms [82], technologies co-constitute our intentionality [107], and by extension our ethical action, either by acting as a mediator of our ability to act or by re-shaping our relationship to the world in a way that influences how we may act. Thorie's shifting water faucet can be seen as a mediator that co-constitutes an individual's ethical intentionality. It reshapes a static interaction between an individual and a faucet, into a dynamic interaction that serves to reveal the faucet as a mediator between the individual and the water reservoir – thus the relationship becomes visible and an ethical choice is prompted. The shifting looseness of the faucet disrupts a *sedimented movement* – the way in which a technology invites someone to move or use their body to interact with it [32]. A faucet normally remains static which habituates the movements and sensations that arise when we interact with it and thus the faucet fades into the background of our experience. By constantly disrupting these sedimented movements with a shifting tension, the faucet exemplifies Thorie's ethical sensibility; a constant and ongoing attentiveness towards water consumption.

Engaging with Entangled Self: Encountering Materials, Ethics, and Agencies: Soma design practice is characterized by slow and repeated material and technological encounters [57]. This process allowed Thorie to become familiar with the different textures and materialities of the energies flowing through her home, but also helped her understand the different qualities of attention that energies can elicit. She became attentive to its vital materiality [16] and the shifting agencies of energy that were revealed and concealed during different interactions. Thorie reflected that energy usage often fades into the background amidst the other demands of life, making it harder to foster a meaningful, critical engagement with energy. It was through attentiveness to the agency of energy that she was best able to start attuning to her practices. This is reflective of the complex materials we often work with in soma design. Many interactive materials change with use and some computational design materials are harder to 'feel'. Soma design strives to make computational design materials visible and palpable in the design process [57]; exploring intelligent systems that are 'graspable' rather than purely explainable [43, 44], transfiguring abstract bodily data through tangible and perceptible modalities [5], and drawing attention to the felt or experiential aspects of data that manifest in our entangled lives [83]. This not only helps us understand their aesthetic potential but also their agential capacity to shape the ethics of an interaction. This is exemplified by the faucet – the palpable tension and looseness is an agentic mechanism designed to foster an ethical relationship with the water in the reservoir. Understanding the agency of our materials may allow us to better engage with the temporality of our designs, their potential consequences, their capacity to transform lives [94], as

well as their eventual decomposition and disposal [109]. Our materials and technological encounters can be a step towards viewing humans and non-humans as a meaningful whole [109], drawing attention to the material-discursive agency [96] that constitutes the design process. Attending to our encounters, as enactments of situated knowledge [50] and practices [97], can allow us to better understand the agency of our design materials to shape our ethical sensibilities, decision-making, and action-taking.

5 CULTIVATING ETHICAL SENSIBILITY: EMBRACING CHALLENGE AND CRITIQUE

We have described the analytical, pragmatic, and practical engagement of a felt ethics. Here, we outline the second dimension of practicing felt ethics; that of *an ongoing critical attentiveness to the limits of our own bodies and lived experiences*. This highlights the need to attend to the boundaries of our bodies and lived experiences, our positionalities and values, and the ultimate limitations of our practice. This makes explicit a previously implicit aspect of somaesthetics: critically addressing our own bodies' role in sustaining social and political power [92]. This is not only so we ourselves can reflect and critique our practice, but also so the potential consequences of our design work can be better understood and the ethical questions we explore can be better situated in relation to wider consideration of ethical issues. The practice of a felt ethics does not imply a focus on oneself *at the expense* of considering ethical issues at a larger scale. Felt ethics must be practiced with a critical attentiveness towards our situated positions as researchers in relation to ethical problems at large. Here, we outline three questions that we foreground in our critical engagement with a felt ethics.

What are the limitations of our own bodies and lived experiences?

The most obvious limitation of our ethical sensibilities is that our own bodies and experiences can be limited in ways we cannot address [98]. Our knowledge is contextual [50], which inevitably shapes our engagement with ethics. The authors of this paper are situated in wealthy academic institutions in the Global North, which offers us enough safety to attend to our bodies, vulnerabilities, and discomfort. Many of the discomforts, vulnerabilities, and risks we write about in this paper are not as potentially harmful as those experienced by others. We especially recognize that a felt ethics – a practice of engaging with the technologically-entangled and socio-cultural body – may be differently meaningful for those who experience discrimination for having, or being perceived to have, non-normative bodies; be it through disability [37], gender [24], or race [15]. "*There's no body as such: there are only bodies – male or female, black, brown, white – large or small – and all the gradations in between*" [47, p.19]. These bodies exist in different contexts and are disciplined in different ways. While practicing soma design, we strive to make this a space to focus on our shared vulnerabilities rather than the differences of our privileged statuses and build connection on the basis of these vulnerabilities. However, we cannot declare that our own ethical intentionality presents an easy path to overcome complex societal challenges that may surround or imbue our design practice. Equally, we recognise that soma design itself has a strong set of values that will inevitably shape any ethical discussion that happens within that design space. Sometimes, we

see the most ethical course of action as acknowledging where our own practices, knowledge, and sensibilities are limited. Therefore, we see meaningful engagement with our ethical sensibilities as recognising the situated perspectives from which they arise and seeking to understand how those perspectives may be limited and exclusionary. If necessary, this might entail acknowledging our own sensibilities and practices as insufficient, and pragmatically seeking other approaches or worldviews that are better situated to engage with the issue at hand.

How do our ethical sensibilities shape our designs and knowledge production? We must also critically attend to how our ethical sensibilities shape our designs and knowledge generation. Soma design is a practice of researching through design [81], wherein designers attempt to make the "*right thing: a product that transforms the world from its current state to a preferred state*" [114]. Research through design can therefore be viewed as simultaneously an aesthetic and ethical enquiry, transformative explorations that probe what it means to live well [29, 112]. These aesthetic enquiries are inevitably shaped by our ethical sensibilities; aesthetic statement of our own ethical values expressed through designed artefacts or a speculation of the future we seek to create [94]. Ståhl et al. show how a design process is a matter of somatic 'intra-action' (a relational exchange) between the technologies or materials of the design process and the designers who engage with them [96]. Barad terms this an ethico-onto-epistemology or how "*a relational, situated and embodied model of (inter)subjectivity [...] reveals how ethics, being, and knowing no longer can be separated*" [9, p.392]. We cannot – nor should we – separate the epistemology of design from our own ethical sensibilities. Design as a method of ethical enquiry needs to be treated with deep analysis, critique, and reflection on the world that we are participating in bringing to fruition (irrespective of whether we desire such futures). Such transformative enquiries can mediate ethics in unintended ways [108]; reflecting the limitations in our own experiences, manifesting biases or pre-conceptions of the type of bodies that will interact with our designs [15], or reinforcing the socio-cultural norms and political disciplining of how different bodies are expected to move [111]. Much like our ethical and aesthetic sensibilities, design research programs should not remain static [81], for they can support a plurality of worldviews that enable us to challenge our situated perspectives and explore the multistability of our designs (how designs change with context) [82]. Redström argues that it is crucial we treat our research programs as provisional and unstable [81]. We agree with his position, for if research programs stagnate, we may stop challenging ourselves and the basic ideas at the heart of our design practice, leading to knowledge and designed artefacts that reproduce the same values and ideals without realizing it may be time to move on [81].

How can we foster an environment where others are given agency to challenge our sensibilities and practices? Power relationships and hierarchies on the sites of technological production are inevitable. Rendering our ethical practices visible and open to challenge means little if the agency of others to challenge such practices is suppressed. We recognize that soma design exists in the situation of safety within the world shaped by post-colonial structures – where the safety of some is a privilege at the expense of others. Through critical reflection on our implicit ethics and values, both soma design and felt ethics attempt to challenge the established orders that

have shaped our bodies; orders that may be built on (potentially hidden) hierarchies, violence, and oppression. This has the potential to foster awareness of the organisations and power structures around us, in turn making us more aware of the power imbalances we unknowingly reproduce and the discomforts we may choose to ignore. However, questioning the normative and structural ways we interact with each other will not necessarily solve these issues. Further, to act upon one's ethical intentionality requires a person to have a level of power to exercise their own agency – power and agency which themselves are shaped by the inequities within the power structures we seek to challenge. This is, as yet, a complex and unexplored challenge for the felt ethics approach, but one with which we must be willing to meaningfully engage.

There is a complicated entanglement between ethical intentionality, agency, and power that will inevitably permeate our engagement with a felt ethics – just as these issues pervade design practice – and we certainly do not claim that our approach offers an easy or straightforward path to remedying these complex problems. However, the value of reflective practice is well understood [86], and we view constant attentiveness to these limits as part of meaningfully engaging with our ethical sensibilities, and in turn, that these limits require us to make our ethical positions visible as a matter of care.

6 EMBRACING CHALLENGE AND CRITIQUE: A CARE ETHICS APPROACH

The need to engage meaningfully with the limitations of our practice, underscores the import of making our unspoken ethical practices explicit and open to challenge. Thus, we advocate for a third dimension of practicing felt ethics; that of *rendering visible our ethical practices as a matter of care*. In part, this is because we need to make such positions visible to better attend to our own practices. However, soma design processes are also often reported on from the first-person perspective [1, 59, 76] and may contain deeply personal narratives of experiences generated through elicitation [18, 77] and self-reporting techniques [20, 23]. We regard calls for greater honesty and authenticity in the self-reporting of design research, concerning emotional difficulties [8], vulnerabilities [80], and failures [63], as being vital to revealing the ethical complexities of how we experience ourselves and our entangled relationships. Our situated ethical practices also need to be rendered visible for the integrity of our research reporting and for such positions to open to challenge from others. Allowing others to discuss, critique, and challenge our ethical practices also plays a role in cultivating ethical sensibility, not only individually but also collectively as a research group, design studio, or even as an academic field. We advocate for approaching this as a matter of care [27].

The ethos of care resonates well with the somaesthetic process of cultivating ethical sensibilities – the ongoing practice of making situated moral judgements that develop an ethical sensibility attuned to a relational understanding of humanity. We need to attend to own our ethical positions, being attentive and critical to the values and ideals that we hold [27]. Although virtue ethics might resonate more with the Aristotelian undercurrents [12] of the somaesthetic project, we choose to draw on an ethics of care as a guiding approach. We draw on the four main principles that

establish the integrity of care: attentiveness, responsibility, competence, and responsiveness [103]. These presume the awareness and recognition of where care is needed in our approach, accounting for the vulnerabilities of others and ourselves, considering the consequences and most competent ways of approaching our ethics in practice, and accepting the responsibility to act. In other words, we do not simply enact and cultivate our virtues; we seek to question how such virtues were established, whom they serve, and whether we are cultivating them 'as well as possible'. An ethics of care also presents us with an approach to engage with the complexities of pluralism in ethical sensibilities – though we derive our approach to care from pluralistic and situated practices, we simultaneously resist subjectivism and moral relativism [104]. As soma designers, we can advocate for our ideals and values as only one of a plurality of approaches to design, but we also have an obligation to challenge practices we find unethical. Just as we need to constantly challenge the ethics of our own practice, we need to be both open to and critical of others. We also find that an attitude of care allows us to 'stay with trouble' [51] in our design practice. Aspects of care, labour, work, ethics, and politics do not always sit well together, nor are they evenly distributed [27]. The reconciliation between care with scale – the concentration of resources required to produce technology – is an enterprise that is far from straightforward. A care ethics approach, then, is a commitment to do the ongoing work of ethical decision-making and action-taking concerning what it means to design technologies for living well in a complex technological landscape.

The complex landscape – a web of biological, technological, economic, social and political systems, processes, and events [4] – can be viewed as an entangled ontology that serves to ethically constitute our bodies and our sensibilities. It is by tracing the fibers of this web that we can best understand how our ethical sensibilities are shaped and, in turn, understand how our own ethical agency traverses back along the threads of this web to an entangled world – one of a plurality of bodies and technologies. Matters of care refer to honest and authentic accounts of our messy, impure involvements in this socially and politically imperfect world where the questions of *how best* to care need to be constantly posed [27] and the consequences and implications of our designs need to be considered beyond the human-centered world [109]. We draw on the work of Puig de la Bellacasa who reorientates care in a speculative fashion towards the entanglement of human and non-human agencies [27] – one designed to highlight the absurdity of disentangling these agencies when considering the ethics of our design practice. To make care matter entails that we do not shy away from the contested and burdensome implications of care, as a potential source of labour, vulnerability, and exploitation [54]. Care is not only an attitude with which we approach our design practice. It is also an omnipresent aspect of a technological landscape, even in its absence [27]. Our designs, artefacts, and knowledge should not be uncaring aspects of this entangled world.

7 FELT ETHICS – A SOMA DESIGN APPROACH

We have theoretically, analytically, and conceptually developed a felt ethics through the perspective of soma design and by illustrating our approach with the example of a somaesthetically designed

artefact. We reject the dichotomy between reason and emotion – and the dichotomy between ethics and aesthetics in design – as both are extensions of the mind/body dichotomy. This, in turn, allows us to introduce the cultivation of somatic-based ethical sensibilities as a viable path to engaging with ethics in design practice. Finally, we articulate this contribution; the qualities of felt ethics as our approach. Felt ethics is intended to complement our existing methods of engaging with the body in soma design practice. These seven qualities, or attitudes, are intended to lend ethical intention and reflection to our practice – rendering visible and foregrounding our engagement with ethics.

1. Processual Ethical Sensibilities. The cornerstone of our approach lies in acknowledging that we have ethical sensibilities – sensitivities towards ourselves, others, and situations in which we find ourselves – that are rooted in our corporeal and phenomenological selves [71, 88]. We attend to how our ethical sensibilities manifest in our aesthetic ideals and design practice. One such ideal is that of somaesthetic cultivation; an approach which is characterized by analytical, pragmatic, and practical engagement [91]. This can be considered a processual form of ethics focused on ethical and moral intention and reflection through enhancing our capacity for ethical sense-making and action-taking.

2. Generative Ethics. Sensitizing ourselves to our ethical sensibilities involves engaging with many different experiences – be they pleasurable, enthralling, troubling, or provocative – to gain both aesthetic and ethical appreciation of these experiences [91]. We seek to understand the boundaries of our ethical sensibilities and reveal those ingrained so deeply that we are not yet aware of them [90] – challenging and remaking sensibilities to enhance our capacity to relate ethically to one another. We seek to engage with ethics as an aspect of generative design work – designing fulfilling and meaningful experiences as a means of envisioning potential futures.

3. Transformative Explorations. Our ethical sensibilities are, therefore, inseparable from the epistemology of design research [81]. Our artefacts are ethical enquiries into a future world we desire to bring to fruition. They are statements of aesthetic and ethical value expressed through design. This shapes the knowledge we generate [9]. We view our transformative explorations with deep analysis, reflection, and critique, treating our research programs as provisional and in need of cultivation [81]. These research programs can enable us to engage with a plurality of worldviews that can help us attend to the temporality and multistability of our design research [82].

4. Discomfort, Vulnerability, and Risk. Enhancing our capacity for ethical sense-making and action-taking sometimes entails confronting our ethical sensibilities. Our process of relearning an ethical sensibility may not be easy and requires attending to moments of discomfort [91]. These are moments when our sensibilities and sensitivities are challenged. To face discomfort, in turn, necessitates an active engagement with vulnerability. Both vulnerability and risk – challenging our norms, values, and habits whilst exposing our inner thoughts and experiences to our own scrutiny or that of others – are a part of the somaesthetic process [80].

5. Political and Socio-Cultural Norms. Our bodies are inherently shaped and disciplined by our socio-cultural and political context [47]. Our approach involves challenging our ingrained norms, values, and habits. It may also entail confronting larger systems (enacted and imprinted on us) which may be built around hidden hierarchies, violence, or oppression. Estranging our habitual ways of living reveals how these systems may be enacted both on and through our bodies. We can attend to how they shape our ethical sensibilities.

6. Somatic Freedoms. Our approach requires attending to how our designs may reaffirm or subvert the political disciplining of bodies. We question whether an interaction is based on constraining or enhancing somatic freedoms and moral agency. Designs may support the somatic freedoms and moral agencies of others by enabling them to act, thereby, making it possible for moral agency – such as care, responsibility, and accountability – to be exerted [32].

7. Critique and Care. Our approach requires critically, carefully, and consistently attending to the ethics of our practice. We engage with the limits of our bodies and experiences, our values and positionalities, and our place within power and social structures to understand how these factors shape our situated and contextual research enquiries. We also render our ethical practices and sensibilities visible and open to challenge as a matter of care [27]; not shying away from the complexities and implications of our approach. Care guides us in the continuous work of making ethical decisions in a messy and imperfect world [104].

8 CONCLUSION

Much like design itself [22], the practice of ‘feeling ethics’ will be entangled across beliefs, cultures, interpersonal conflicts, ecological struggles, and social dilemmas. Felt ethics as described here presents us, the authors (and perhaps even all soma designers), as relatively homogeneous in our values and beliefs. This means there is still work to be done concerning how the felt ethics approach would meaningfully address conflict within our own position. Ethical and moral intentionalities will inevitably clash – we certainly eschew moral relativism – and we do not envision harmonious agreement (even among ourselves) regarding what we consider to be a morally correct course of action. The reconciliation of first-person approaches with a pluriverse of bodies, values, and opinions remains a question of import for the future development of our position. Our felt ethics is also firmly situated within the perspective of soma design. Other practitioners may articulate different approaches that more meaningfully engage with their specific methodological approach. Some may even articulate their own *felt ethics* that is different from the one we have outlined here; developing, complimenting, or even challenging the approach we had put forth. We see the value of theory to HCI as inspiring, prompting reflection, and helping designers make practical choices [78], rather than imposing a single way of using or engaging with them [81, 114]. Therefore, we highly encourage other designers to respond to our felt ethics in this fashion and to contribute to a broader discussion on how ethical sensibilities are engaged and cultivated across the wider field of HCI. Moreover, we also call for

designers to be attentive to how they practice their ethical sensibilities – whether through a felt ethics or otherwise. In a technological landscape that defies overarching solutions or total moral judgments, we find a need to attend to the ethics we practice in our day-to-day design work.

ACKNOWLEDGMENTS

We would like to thank our colleagues who laid the groundwork for our research; Sara Eriksson, Richard Shusterman, Dag Svanaes, and Åsa & Carl Unander-Scharin. We would also like to thank Ron Wakkary for his thoughtful input regarding matters of care in soma design. Finally, we give a special thanks to Þórhildur "Thorie" Ásgeirsdóttir's study participants who played such a formative role in our case study. This work was supported by WASP-HS through a Marianne and Marcus Wallenberg Foundation project MMW 2019.0228, the Swedish Research Council project 2021-04659 *Validating Soma Design*, and the Digital Futures centre at KTH, Stockholm University and RISE.

REFERENCES

- [1] Tony E Adams, Carolyn Ellis, and Stacy Holman Jones. 2017. Autoethnography. *The international encyclopedia of communication research methods* (2017), 1–11.
- [2] Sara Ahmed. 2017. *Living a Feminist Life*. Duke University Press.
- [3] Cheryl Akner-Koler and Parivash Ranjbar. 2016. Integrating Sensitizing Labs in an Educational Design Process for Haptic Interaction. *FormAkademisk* 9, 2 (2016).
- [4] Stacy Alaimo. 2018. Trans-corporeality. *Posthuman glossary* (2018), 435–438.
- [5] Miquel Alfaras, Vasiliki Tsaknaki, Pedro Sanches, Charles Windlin, Muhammad Umair, Corina Sas, and Kristina Höök. 2020. From biodata to somadata. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. 1–14.
- [6] Elizabeth Anderson. 2019. Dewey's Moral Philosophy. In *The Stanford Encyclopedia of Philosophy* (Winter 2019 ed.), Edward N. Zalta (Ed.). Metaphysics Research Lab, Stanford University.
- [7] Þórhildur Ásgeirsdóttir and Rob Comber. 2023. Making Energy Matter: Soma Design for Ethical Relations in Energy Systems. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*.
- [8] Madeline Balaam, Rob Comber, Rachel E Clarke, Charles Windlin, Anna Ståhl, Kristina Höök, and Geraldine Fitzpatrick. 2019. Emotion work in experience-centered design. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. 1–12.
- [9] Karen Barad. 2007. *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. duke university Press.
- [10] Jeffrey Bardzell and Shaowen Bardzell. 2013. What is "critical" about critical design?. In *Proceedings of the SIGCHI conference on human factors in computing systems*. 3297–3306.
- [11] Marian Barnes. 2012. *Care in everyday life: An ethic of care in practice*. Policy Press.
- [12] Robert C Bartlett, Susan D Collins, et al. 2011. *Aristotle's Nicomachean ethics*. University of Chicago Press.
- [13] Genevieve Bell, Mark Blythe, and Phoebe Sengers. 2005. Making by making strange: Defamiliarization and the design of domestic technologies. *ACM Transactions on Computer-Human Interaction (TOCHI)* 12, 2 (2005), 149–173.
- [14] Steve Benford, Chris Greenhalgh, Gabriella Giannachi, Brendan Walker, Joe Marshall, and Tom Rodden. 2012. Uncomfortable interactions. In *Proceedings of the sigchi conference on human factors in computing systems*. 2005–2014.
- [15] Ruha Benjamin. 2019. Race after technology: Abolitionist tools for the new jim code. *Social forces* (2019).
- [16] Jane Bennett. 2010. *Vibrant matter: A political ecology of things*. Duke University Press.
- [17] Renato Bernasconi. 2022. Emancipatory Ways of Feeling (the Body as a Subversive Project). *Diseña* 20 (2022), Editorial–Editorial.
- [18] Michel Bitbol and Claire Petitmengin. 2017. Neurophenomenology and the microphenomenological interview. *The Blackwell companion to consciousness* 2 (2017), 726–739.
- [19] Pierre Bourdieu. 1979. *Distinction*. Routledge & Kegan Paul Ltd.
- [20] Glynis M Breakwell. 2006. Using self-recording: Diary and narrative methods. *Research methods in psychology* 3 (2006), 254–272.
- [21] William Bristow. 2017. Enlightenment. In *The Stanford Encyclopedia of Philosophy* (Fall 2017 ed.), Edward N. Zalta (Ed.). Metaphysics Research Lab, Stanford University.
- [22] Richard Buchanan. 1992. Wicked problems in design thinking. *Design issues* 8, 2 (1992), 5–21.
- [23] Karen Anne Cochrane, Kristina Mah, Anna Ståhl, Claudia Núñez-Pacheco, Madeline Balaam, Naseem Ahmadpour, and Lian Loke. 2022. Body Maps: A Generative Tool for Soma-based Design. *ACM International Conference Proceeding Series*. <https://doi.org/10.1145/3490149.3502262>
- [24] Sasha Costanza-Chock. 2020. *Design justice: Community-led practices to build the worlds we need*. The MIT Press.
- [25] Kate Crawford. 2021. *The atlas of AI: Power, politics, and the planetary costs of artificial intelligence*. Yale University Press.
- [26] Antonio R Damasio. 2006. *Descartes' error*. Random House.
- [27] Maria Puig de La Bellacasa. 2017. *Matters of care: Speculative ethics in more than human worlds*. Vol. 41. U of Minnesota Press.
- [28] John Dewey. 1958. *Experience and nature*. Vol. 471. Courier Corporation.
- [29] John Dewey. 2005. *Art as experience*. Penguin.
- [30] Paul Dourish, Janet Finlay, Phoebe Sengers, and Peter Wright. 2004. Reflective HCI: Towards a critical technical practice. In *CHI'04 extended abstracts on Human factors in computing systems*. 1727–1728.
- [31] Joanne Entwistle. 2015. *The fashioned body: Fashion, dress and social theory*. John Wiley & Sons.
- [32] Sara Eriksson, Kristina Höök, Richard Shusterman, Dag Svanes, Carl Unander-Scharin, and Åsa Unander-Scharin. 2020. Ethics in Movement: Shaping and Being Shaped in Human-Drone Interaction. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. 1–14.
- [33] Sara Eriksson, Åsa Unander-Scharin, Vincent Trichon, Carl Unander-Scharin, Hedvig Kjellström, and Kristina Höök. 2019. Dancing with drones: Crafting novel artistic expressions through intercorporeality. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. 1–12.
- [34] Arturo Escobar. 2018. Designs for the Pluriverse. In *Designs for the Pluriverse*. Duke University Press.
- [35] Daniel Fallman. 2008. The interaction design research triangle of design practice, design studies, and design exploration. *Design issues* 24, 3 (2008), 4–18.
- [36] Silvia Federici. 2011. *Feminism and the politics of the commons*. na.
- [37] Laura Forlano. 2016. Hacking the feminist body. *Journal of Peer Production* 8 (2016).
- [38] Michel Foucault. 1990. *The history of sexuality: An introduction*. Vintage.
- [39] Michel Foucault. 2012. *The birth of the clinic*. Routledge.
- [40] Christopher Frauenberger. 2019. Entanglement HCI the next wave? *ACM Transactions on Computer-Human Interaction (TOCHI)* 27, 1 (2019), 1–27.
- [41] Christopher Frauenberger, Marjo Rauhala, and Geraldine Fitzpatrick. 2017. Interaction ethics. *Interacting with Computers* 29, 2 (2017), 220–236.
- [42] Eugene T Gendlin. 1986. Process ethics and the political question. In *The Moral Sense in the Communal Significance of Life*. Springer, 265–275.
- [43] Maliheh Ghajargar, Jeffrey Bardzell, Alison Smith Renner, Peter Gall Krogh, Kristina Höök, David Cuatrecasas, Laurens Boer, and Mikael Wiberg. 2021. From "explainable ai" to "graspable ai". In *Proceedings of the Fifteenth International Conference on Tangible, Embedded, and Embodied Interaction*. 1–4.
- [44] Maliheh Ghajargar, Jeffrey Bardzell, Alison Marie Smith-Renner, Kristina Höök, and Peter Gall Krogh. 2022. Graspable AI: Physical Forms as Explanation Modality for Explainable AI. In *Sixteenth International Conference on Tangible, Embedded, and Embodied Interaction*. 1–4.
- [45] Carol Gilligan. 1993. *In a different voice: Psychological theory and women's development*. Harvard University Press.
- [46] Colin M Gray and Elizabeth Boling. 2016. Inscripting ethics and values in designs for learning: a problematic. *Educational technology research and development* 64, 5 (2016), 969–1001.
- [47] Elizabeth Grosz. 1994. *Volatile bodies : toward a corporeal feminism*. Allen and Unwin St. Leonards, N.S.W.
- [48] Elizabeth Grosz. 2020. *Sexual subversions*. Routledge.
- [49] Garry Hagberg. 2014. Wittgenstein's Aesthetics. In *The Stanford Encyclopedia of Philosophy* (Fall 2014 ed.), Edward N. Zalta (Ed.). Metaphysics Research Lab, Stanford University.
- [50] Donna Haraway. 2020. Situated knowledges: The science question in feminism and the privilege of partial perspective. In *Feminist theory reader*. Routledge, 303–310.
- [51] Donna J Haraway. 2016. *Staying with the trouble: Making kin in the Chthulucene*. Duke University Press.
- [52] Virginia Held et al. 2006. *The ethics of care: Personal, political, and global*. Oxford University Press on Demand.
- [53] Karey Helms. 2022. A Speculative Ethics for Designing with Bodily Fluids. In *CHI Conference on Human Factors in Computing Systems Extended Abstracts*. 1–11.
- [54] Karey Helms and Ylva Farnaeus. 2021. Troubling Care: Four Orientations for Wickedness in Design. In *Designing Interactive Systems Conference 2021*. 789–801.

- [55] Arlie Russell Hochschild. 2015. The managed heart. In *Working in America*. Routledge, 47–54.
- [56] Sarah Homewood, Marika Hedemyr, Maja Fagerberg Ranten, and Susan Kozel. 2021. Tracing conceptions of the body in HCI: From user to more-than-human. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. 1–12.
- [57] Kristina Höök. 2018. *Designing with the body: Somaesthetic interaction design*. MIT Press.
- [58] Kristina Höök, Steve Benford, Paul Tennent, Vasiliki Tsaknaki, Miquel Alfaras, Juan Martínez Avila, Christine Li, Joseph Marshall, Claudia Daudén Roquet, Pedro Sanches, et al. 2021. Unpacking non-dualistic design: The soma design case. *ACM Transactions on Computer-Human Interaction (TOCHI)* 28, 6 (2021), 1–36.
- [59] Kristina Höök, Baptiste Caramiaux, Cumhur Erkut, Jodi Forlizzi, Nassrin Hajinejad, Michael Haller, Caroline CM Hummels, Katherine Isbister, Martin Jonsson, George Khut, et al. 2018. Embracing first-person perspectives in soma-based design. In *Informatics*, Vol. 5. MDPI, 8.
- [60] Kristina Höök, Sara Eriksson, Marie Louise Juul Søndergaard, Marianela Cioffi Felice, Nadia Campo Woytuk, Ozgun Kilic Afsar, Vasiliki Tsaknaki, and Anna Ståhl. 2019. Soma Design and Politics of the Body. In *Proceedings of the Halfway to the Future Symposium 2019*. Association for Computing Machinery.
- [61] Kristina Höök, Martin Jonsson, Anna Ståhl, Jakob Tholander, Toni Robertson, Patrizia Marti, Dag Svanaes, Marianne Graves Petersen, Jodi Forlizzi, Thecla Schiphorst, et al. 2016. Move to be Moved. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems*. 3301–3308.
- [62] Kristina Höök, Martin P Jonsson, Anna Ståhl, and Johanna Mercurio. 2016. Somaesthetic appreciation design. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*. 3131–3142.
- [63] Noura Howell, Audrey Desjardins, and Sarah Fox. 2021. Cracks in the success narrative: Rethinking failure in design research through a retrospective trioethnography. *ACM Transactions on Computer-Human Interaction (TOCHI)* 28, 6 (2021), 1–31.
- [64] Tim Ingold and Jo Lee Vergunst. 2008. *Ways of walking: Ethnography and practice on foot*. Ashgate Publishing, Ltd.
- [65] Asle H Kiran. 2015. Four dimensions of technological mediation. *Postphenomenological investigations* 123 (2015), 123–140.
- [66] Paul Komisaroff. 2008. *Experiments in love and death: medicine, postmodernism, microethics and the body*. Melbourne Univ. Publishing.
- [67] Joseph La Delfa, Mehmet Aydin Baytas, Rakesh Patibanda, Hazel Ngari, Rohit Ashok Khot, and Florian 'Floyd' Mueller. 2020. Drone chi: Somaesthetic human-drone interaction. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. 1–13.
- [68] Wonjun Lee, Youn-kyung Lim, and Richard Shusterman. 2014. Practicing somaesthetics: exploring its impact on interactive product design ideation. In *Proceedings of the 2014 conference on Designing interactive systems*. 1055–1064.
- [69] Lian Loke and Claudia Núñez-Pacheco. 2018. Developing somatic sensibilities for practices of discernment in interaction design. *The Senses and Society* 13, 2 (2018), 219–231. <https://doi.org/10.1080/17458927.2018.1468690> arXiv:<https://doi.org/10.1080/17458927.2018.1468690>
- [70] Jonas Löwgren and Erik Stolterman. 2004. *Thoughtful interaction design: A design perspective on information technology*. Mit Press.
- [71] Maurice Merleau-Ponty. 1968. *The visible and the invisible: Followed by working notes*. Northwestern University Press.
- [72] Maurice Merleau-Ponty. 2013. *Phenomenology of perception*. Routledge.
- [73] Christian Meyer, Jürgen Streeck, and J Scott Jordan. 2017. *Intercorporeality: Emerging socialities in interaction*. Oxford University Press.
- [74] Cosmin Munteanu, Heather Molyneaux, Wendy Moncur, Mario Romero, Susan O'Donnell, and John Vines. 2015. Situational ethics: Re-thinking approaches to formal ethics requirements for human-computer interaction. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*. 105–114.
- [75] Harold G Nelson and Erik Stolterman. 2014. *The design way: Intentional change in an unpredictable world*. MIT press.
- [76] Carman Neustaedter and Phoebe Sengers. 2012. Autobiographical design in HCI research: designing and learning through use-it-yourself. In *Proceedings of the Designing Interactive Systems Conference*. 514–523.
- [77] Claudia Núñez-Pacheco and Lian Loke. 2022. Focusing for Interaction Design: An Introspective Somatic Method. In *CHI Conference on Human Factors in Computing Systems*. 1–18.
- [78] Antti Oulasvirta and Kasper Hornbæk. 2022. Counterfactual thinking: What theories do in design. *International Journal of Human-Computer Interaction* 38, 1 (2022), 78–92.
- [79] Michael Polanyi. 1967. *The tacit dimension*. Garden City, New York 217 (1967).
- [80] Kristina Popova, Rachael Garrett, Claudia Núñez-Pacheco, Airi Lampinen, and Kristina Höök. 2022. Vulnerability as an ethical stance in soma design processes. In *CHI Conference on Human Factors in Computing Systems*. 1–13.
- [81] Johan Redstrom. 2017. *Making design theory*. MIT Press.
- [82] Robert Rosenberger and Peter PCC Verbeek. 2015. *Postphenomenological investigations: essays on human-technology relations*. Lexington Books.
- [83] Pedro Sanches, Noura Howell, Vasiliki Tsaknaki, Tom Jenkins, and Karey Helms. 2022. Diffraction-in-action: Designerly Explorations of Agential Realism Through Lived Data. In *CHI Conference on Human Factors in Computing Systems*. 1–18.
- [84] Thecla Schiphorst. 2011. Self-evidence: applying somatic connoisseurship to experience design. In *CHI'11 extended abstracts on human factors in computing systems*. 145–160.
- [85] Donald A Schon. 1979. The reflective practitioner. *New York* (1979).
- [86] Phoebe Sengers, Kirsten Boehner, Shay David, and Joseph 'Jofish' Kaye. 2005. Reflective design. In *Proceedings of the 4th decennial conference on Critical computing: between sense and sensibility*. 49–58.
- [87] Phoebe Sengers, John McCarthy, and Paul Dourish. 2006. Reflective HCI: articulating an agenda for critical practice. In *CHI'06 extended abstracts on Human factors in computing systems*. 1683–1686.
- [88] Maxine Sheets-Johnstone. 2008. *The roots of morality*. Penn State Press.
- [89] Maxine Sheets-Johnstone. 2011. *The primacy of movement*. Vol. 82. John Benjamins Publishing.
- [90] Richard Shusterman. 2008. *Body consciousness: A philosophy of mindfulness and somaesthetics*. Cambridge University Press.
- [91] Richard Shusterman. 2012. *Thinking through the body: Essays in somaesthetics*. Cambridge University Press.
- [92] Richard Shusterman. 2018. Performing live. In *Performing Live*. Cornell University Press.
- [93] Katta Spiel, Emeline Brulé, Christopher Frauenberger, Gilles Bailly, and Geraldine Fitzpatrick. 2018. Micro-ethics for participatory design with marginalised children. In *Proceedings of the 15th Participatory Design Conference: Full Papers-Volume 1*. 1–12.
- [94] Anna Ståhl, Madeline Balaam, Rob Comber, Pedro Sanches, and Kristina Höök. 2022. Making New Worlds—Transformative Becomings with Soma Design. In *CHI Conference on Human Factors in Computing Systems*. 1–17.
- [95] Anna Ståhl, Martin Jonsson, Johanna Mercurio, Anna Karlsson, Kristina Höök, and Eva-Carin Banka Johnson. 2016. The soma mat and breathing light. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems*. 305–308.
- [96] Anna Ståhl, Vasiliki Tsaknaki, and Madeline Balaam. 2021. Validity and Rigour in Soma Design-Sketching with the Soma. *ACM Trans. Comput.-Hum. Interact.* 28, 6, Article 38 (dec 2021), 36 pages. <https://doi.org/10.1145/3470132>
- [97] Lucy Suchman and Lucy A Suchman. 2007. *Human-machine reconfigurations: Plans and situated actions*. Cambridge university press.
- [98] Dag Svanaes and Louise Barkhuus. 2020. The designer's body as resource in design: Exploring combinations of point-of-view and tense. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. 1–13.
- [99] Dag Svanaes and Martin Solheim. 2016. Wag your tail and flap your ears: The kinesthetic user experience of extending your body. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems*. 3778–3779.
- [100] Paul Tennent, Kristina Höök, Steve Benford, Vasiliki Tsaknaki, Anna Ståhl, Claudia Dauden Roquet, Charles Windlin, Pedro Sanches, Joe Marshall, Christine Li, et al. 2021. Articulating Soma Experiences using Trajectories. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. 1–16.
- [101] Benjamin R Tilghman. 1991. *Wittgenstein, ethics, and aesthetics: The view from eternity*. SUNY Press.
- [102] Joan C Tronto. 1995. Women and Caring: What Can Feminists Learn About Morality from Caring?[1989]. In *Justice and care*. Routledge, 101–116.
- [103] Joan C Tronto. 1998. An Ethic of Care. *Generations: Journal of the American Society on Aging* 22, 3 (1998), 15–20. <http://www.jstor.org/stable/44875693>
- [104] Joan C Tronto. 2020. *Moral boundaries: A political argument for an ethic of care*. Routledge.
- [105] Vasiliki Tsaknaki, Madeline Balaam, Anna Ståhl, Pedro Sanches, Charles Windlin, Pavel Karpashevich, and Kristina Höök. 2019. Teaching soma design. In *Proceedings of the 2019 on Designing Interactive Systems Conference*. 1237–1249.
- [106] Francisco J Varela. 1999. *Ethical know-how: Action, wisdom, and cognition*. Stanford University Press.
- [107] Peter-Paul Verbeek. 2008. Cyborg intentionality: Rethinking the phenomenology of human–technology relations. *Phenomenology and the Cognitive Sciences* 7, 3 (2008), 387–395.
- [108] Peter-Paul Verbeek. 2008. Morality in design: Design ethics and the morality of technological artifacts. In *Philosophy and design*. Springer, 91–103.
- [109] Ron Wakkary. 2021. *Things we could design: For more than human-centered worlds*. MIT press.
- [110] Danielle Wilde, Anna Vallgård, and Oscar Tomico. 2017. Embodied design ideation methods: analysing the power of estrangement. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*. 5158–5170.
- [111] Langdon Winner. 1980. Do Artifacts Have Politics? *Daedalus* 109, 1 (1980), 121–136.

- [112] Ludwig Wittgenstein. 1966. *Lectures & conversations on aesthetics, psychology, and religious belief*. Univ of California Press.
- [113] Ludwig Wittgenstein. 2013. *Tractatus logico-philosophicus*. Routledge.
- [114] John Zimmerman, Jodi Forlizzi, and Shelley Evenson. 2007. Research through design as a method for interaction design research in HCI. In *Proceedings of the SIGCHI conference on Human factors in computing systems*. 493–502.