It's not (just) about the robots: care and carelessness across an automated supply chain

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Care and carelessness across an automated supply chain

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Dissertation

for the purpose of obtaining the degree of doctor
at Delft University of Technology
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chair of the Board for Doctorates
to be defended publicly on
December 10th 2024 at 12:30h

by

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Master of Philosophy,
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This dissertation has been approved by the promotors.

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Publication and Authorship Overview

Journal Articles

Chapter ten: Ley, M. (2023). Care Ethics and the Future of Work: A Different Voice. *Philosophy & Technology*, *36*(1), 7.

- Single-authored paper, helped immensely by the generous and thoughtful edits and comments of my supervisors, Sabine Roeser and Filippo Santoni de Sio.

Chapter eight: Mecacci, G., Ley, M., & Santoni de Sio, F. (*to be submitted 2024*). Ethics of Retail Robots: Mapping the Field.

- Co-authored with Giulio Mecacci (first author) and Filippo Santoni de Sio (third author), not yet submitted to journal. I helped outline the types of robots as well as some preliminary ethical concerns. Giulio is responsible for much of the framing and writing of the sections on values, though we have written in an iterative process. Filippo aided in the initial set-up and the paper's framing.

Chapter twenty-one: Ley, M. (submitted adapted version, November 2024). Caring About Food: Attending to Your Swipe Click-Buy Habit. *Noema Magazine.*

- Single-authored paper, helped immensely by the generous and thoughtful edits and comments of my supervisors, Sabine Roeser and Filippo Santoni de Sio.

Book Chapters

Chapter six: Ley, M. (2021) "Being Sophia: What Makes the World's First Robot Citizen?"In Nathan Rambukkana (ed.) *Intersectional Automations*. Lexington.

- This paper was roughly drafted before beginning my PhD at TU Delft while pursuing my initial doctoral studies at York University, but was developed and polished during my doctoral contract at TU Delft. A single-authored paper that was improved by the edits of Nathan Rambukkana and two anonymous reviewers.

Chapter seven: Van Wynsberghe, A., Ley, M., & Roeser, S. (2022). Ethical aspects of human–robot collaboration in industrial work settings. In M.I.A. Ferreira., & S. R. Fletcher (Eds), *The 21st Century Industrial Robot: When Tools Become Collaborators* (p. 255-266). Springer.

- Written iteratively with Aimee van Wynsberghe (first author and Sabine Roeser (third author).

Commentary

Chapter eleven: Ley, Madelaine (2023). "Response to Emotions and Automation in a High-Tech Workplace: a Commentary". Philosophy and Technology 36 (1):1-2.

- Single-authored short commentary on a published response to my paper, "Care Ethcis and the Future of Work: A Different Voice"

Poems (all single-authored)

Chapter sixteen: A Little Mole Mother

Chapter twenty-two: A Poetic Argument in Three Parts

- "The Cost" was recited at *For the Love of the World: Philosophy, Art, and Technology Festival* organized by Studium Generale TU Delft on March 23rd 2024.

Empirical Analysis

Chapter twelve: Empirical Investigations: Systems Thinking in Robotic Workplaces (2021)

- Co-authored with Claudia Werker (second author) who conducted interviews, provided guidance on analysis, and provided ample edits and contributions to the writing. Our research was done in part for TU Delft's Vision Team Robotics' *Robots@Work* team.

Creative and Experimental Essays

Chapter fifteen and eighteen: A Philosophic Interlude: Part One and A Philosophic Interlude: Part Two

- Single-authored, both partially written before beginning my work at TU Delft. Main development and final polishing was all completed during my doctoral contract at TU Delft.

Chapter twenty: Haptic Intimacies

- Single-authored, presented during an online talk for *Life Itself's* series "Posing Questions" (2023, March 11). YouTube. https://www.youtube.com/watch?v=l6p0dKyFCmA

All other writing is single-authored and written during my time at TU Delft. Some has been shared on my personal substack blog, *Beauty in the Mire*, but adapted for this thesis.

those who inspire are co-authors, are they not? my canine roommate, Edgar Alan Pup, who takes me for walks; my daughter, Theodora Grace, who is my gift; my son, Emmett Steven, who is an entirety; the little one unborn but always loved; my husband, Connor Lamont, a builder of dreams; the reeds in Delfts Hout who have the audacity to ten feet in a single season; the ducks who I visit but whose names I do not know; the two pigeons in my backyard (I'm sorry for taking your tree away); the cats that scamper across the shed and get my dog in trouble; my mother, who planted a hundred roses; my father, who shares the music he hears in his head; my brother, who is blossoming; my other brother, who is steadfast; my neighbours at #3; my neighbours at #5; the chickens at #5 and #14 who cluck the day away; my neighbours at #70; Gaston, who runs the windmill; Ethan, the baker at the windmill; my sourdough starter, Patsy; the apple tree we planted; the cows at the farm; the little pony, Milou, who makes me wonder; my fellow writers at London Writer's Salon's 9am zoom meeting; the midwives who tended to me; the kraamzorg people who cared for me; the bay leaves above my desk that protect me; the French pastry shop that provides the treats; the bikes that provide the wheels; the cozy gloomy days; the sunny happy days; the morning rush; the afternoon dips; the window I stared out holding my new babies; the crumpled post-its; the lost pens; the blue-eyed friend who defiantly said ***"intellect without love is nothing"***; and that other renegade who said "I'm not adding another shit paper to the pile of shit papers"; Filippo and Sabine who encouraged me to include my heart; Aimee who got the funding and brought me over the sea; Martijn Wisse, who didn't laugh when teaching me math; Corrado, Mert, Max, and Maxi, who told me about robots; Bart, who dreamt up the lab; the tall windows in the lab; the sourdough bakery near the lab; my previous supervisors, Katharine Streip and Meredith Schwartz, who taught me to use my voice; my mentor, Rodger Hunter, who taught me about regard; my riding coach, MH Lessard, who was tough as nails; the horses who took me for a ride; the turtle named Sammy; the guineapigs at the pet store; this house that wrapped around me as I birthed my babies; the beeswax candles; the bees that helped make the candles; the man on the hill who thinks my family is a bit strange; the cows that graze on the hill; the hill itself that protects and lets us toboggan; the orchard that overflows; the hundred roses bushes that were planted; the eighty-something rose bushes that were determined to live; Anissa, Fatima, and Anna who have helped keep my home from complete dishevelment; Wanda, Shanice, Michelle, Michelle, Sabrina, Iris, Mara, Jacquline, Britt, Simone, Nora, and Myriam who care for my children; the local farmers who care for the animals my family eats for nourishment; my mother-in-law on the island who loves us; my sisters-in-law who expand and inspire me; my Vermont in-laws who are ceaselessly thoughtful; the flowers on my desk giving me some pep; the noise-cancelling headphones; the meditation app; the line of trees outside my office window; my colleagues who join for lunch; my girlfriends from Toronto who cheer me on; my life-long sister, who sends me cakes; the teapot with perpetually cold tea; the bowl that pretends to be the teapot's lid; the hammock that is also heaven; Florence Boivin, who makes art of corners; the whiteboard, who bears all of my ideas without ridicule; the printers, who I have cursed at too many times; the slugs that ate our vegetables; and the paints that I should really get back to.

Table of Contents

1. Things Have Become a Bit Unruly[1]

I am afraid that this dissertation has become rather unhinged. Do not fret— I have met the requirements for a doctoral degree at Delft University of Technology. There are sufficient number of published journal articles and book chapters.[2] There is an introduction and a conclusion that follow academic norms.[3] Well, close enough anyways. But, there are also (brace yourself):

Poetry.	Stories.	Photos.
Drawings.	Metaphors.	A confession.
Meanderings!	A post-it!	Chatty footnotes![4]

I came in with good intentions. Truly, I did. The year was 2019 and I was determined to show the engineers on my project that philosophy was **USEFUL**. I was going to wrangle the concept of care into a tidy package to be applied. And I planned to do it through intellectual prowess.

"Applied". I repeated the word to anyone who would listen in hopes of convincing them and myself that I would be *doing* something with philosophy. And where did I plan to apply theories of care, exactly? To the design of robots in grocery stores and distribution centers, of course. "Care?" many asked early on. "What about another value? Something more timely, like, privacy?" one suggested.

I should have known that things were going to get messy. For a while I managed to keep my ideas organized into sections with headings and arguments with logical conclusions.[5] Then two years later divine timing saw that I hit the middle of my PhD

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1 Written solely for this thesis.

2 Three published papers found in chapters six, seven, and ten. A paper submitted and under review in chapter twenty-one. A paper nearing the submission stage in chapter eight. A published commentary in chapter eleven

3 Chapter four is an introduction that (mostly) follows the norms of Western analytic philosophy. Chapter twenty-four is the conclusion counterpart, although the thinking there gets a little wispy and whirly.

4 Hi!

5 Look at the how tidy chapter seven is, "Ethical Aspects of Human-Robot Collaboration in Industrial Settings". Everything is tucked snuggly into place. And what about chapter ten, "Care Ethics and the Furture of Work: a Different Voice"? You can see the leakage is beginning, but I manage to keep things relatively contained.

at the same time that I had my first child.[6] Either one of these life events alone will thrust a person into existential reflection. Together, my world shifted irreparably. Paradoxically, the exhausted blur of new motherhood granted me clarity. [7] In the year after my daughter was born, I was confronted with how I employed solutionism to the detriment of complexity. I could not ignore how the words in my papers directly opposed my personal shopping and eating ethics.[8] I caught myself scrubbing ideas clean in preparation for publication.

It became too hard to keep my creative yearnings, spiritual intuitions, and intellectual ambitions apart. Everything came crashing in. This dissertation is the rubble.[9] In the heap you will find myriad academic perspectives and themes, ranging from phenomenology, feminist theory and epistemology, philosophy of technology and design, value theory, care ethics, decolonial methodology, food and agriculture politics, and theories of attention. You will also stumble across personal essays, unanswered questions, and quips from my parents.

You may think that in drawing on so many fields and styles I have compromised depth. And perhaps you are right. Instead of a deep dive on a single topic, I offer a tapestry that simultaneously focuses on robots, automation in workplaces and retail, and politics of food technology, while also examining and experimenting with the practice of philosophy and ethics itself.

Why did I include all of this? Have I some trouble editing? The honest truth is that I believe philosophy is about honesty and truth.[10] If I only wrote about robots in grocery stores and withheld my struggle to get food on the table for my family, you would be the recipient of just half the story. To me, the personal and the intellectual are always combined. Perhaps when you are done reading, you will feel the same way.

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6 Now look to chapter twenty-two, "A Poetic Argument in Three Parts". One poem isn't even finished.

7 The clarity of paradox and truth of imprecision is a recurring theme in this dissertation. Pop on down to chapter two, "An Imperfect Methodology" and chapter twenty-four, "A Wide and Narrow Ending", for more.

8 More on this in chapter nineteen, "Inefficient Grocery Routine".

9 Over a year-long collaborative process with artists, scholars, and communities Vanessa Andreotti and Elwood Jimmy developed an analogy of bricks and threads to describe the differences between Western and Indigenous ontologies, epistemologies, and communication. I encourage you to visit their work online, but your intuitions about bricks and threads are likely enough for a basic understanding. Bricks are straight and build things. Threads weave together. Learn more: "Towards Braiding #1: bricks and threads" *Gesturing Towards Decolonial Futures* https://decolonialfutures.net/portfolio/towards-braiding-1-bricks-and threads/?utm_source=substack&utm_medium=email

10 Perhaps you'd better flip/click the next page to see how I envision truth. It's not exactly… tidy.

So here is all of my considered thought on retail robots and the world in which such machines can emerge. I have held nothing back.[11]

I will not abandon you so soon. In few pages, I have drawn up few pathways you might use to explore the dissertation. But first, you really must read about the method to this madness.

[11] Jump down to the last paragraph in chapter twenty-four, "A Wide and Narrow Ending", where I *really* hold nothing back.

Figure 1 What I see in my mind when I think of truth. It is wispy and alive. [12]

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[12] This looks a bit like images from quantum physics, no? I feel a kinship with those rascal-y quantum particles hopping out of sight. This thesis jumps around, too. And yet, from meditations on slugs to interviews with trade union representatives, I am always exploring the same theme: connection and care.

Since I drew this post-it note and placed in on the wall above my computer, I've heard philosopher Charles Eisenstein speak about how the mechanistic worldview of Newtonian physics shapes a culture and politics based on knowability and force. Quantum physics, on the other hand, describes a universe of unpredictable randomness. I like to think of this thesis as a journey into my first experiment with "quantum ethics". It has pieces from the old way of logic and clarity, the morphs into something dynamic and unpredictable. Publication details: Eisenstien, Charles. (2007). *The Ascent of Humanity*. Evolver Editions.

And just one last point: doesn't this look Andreotti and Elwood's tangled ball of threads? (again, this is a wonderful resource: "Towards Braiding #1: bricks and threads" *Gesturing Towards Decolonial Futures* https://decolonialfutures.net/portfolio/towards-braiding-1-bricks-and-threads/?utm_source=substack&utm_medium=email

2. An Imperfect Methodology[13]

It took me until the final year of my PhD to follow my intellectual intuition and step away from the stylistic norms of my academic field. I have resisted the urge to go back and revise earlier work to match my current liberated and political verve. You will see citation practices fluctuate, the use of contractions switch on and off, and the writing style swing from neutral to personal. In not tidying things up and letting the inconsistencies be, I nod towards the possibility of mess, contradiction, and paradox. I offer the reader an opportunity to reflect on the varied ways philosophy and ethics of technology research can be conducted at an engineering university, where projects generally pose neatly defined problems and offer actionable recommendations or solutions.

In my training in Western philosophy, I was taught to guide the reader through every step of an airtight argument. "Tell them what you are going to say. Say it. Tell them what you said." These were my directives. In some places I hold your hand and guide you through the text in the traditional way, but in others I let go. Akin to poetry or gesture, you are left to take up the work however you will. This dissertation, then, is not a unidirectional and absolute transfer of knowledge, but some living thing out of my control. Possibility abounds.[14] Easing my grip and allowing imprecision infuses these pages with a decolonial spirit. Slowly I am edging out of a forceful and extractive mindset. This, however, is a process of which I merely at the beginning.[15]

Weaving in personal stories is another way integrate decolonial as well as feminist ways of knowing within my research. Someone recently called my writing "sort-of unprofessional". In some circles I suspect it might even be considered crass. Both of

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13 Written solely for this thesis.

14 In these last months of writing, I found Nora Bateson's book *Combining* (2023). The pages—filled with essays, poetry, photographs, and collages—gave voice to many of the worries I hold about my doctoral research. Thinking that it was needed for academic publications, I have tried to explain relationality and predict how tinkering might affect relationships. In the earliest pages of *Combining*, however, Nora points to "runaway phenomena", or the exponential unintended consequences (p. 11). We live within, and are of, amazingly complex systems or ecologies. We cannot grasp the happenings within it through ever more complex but objectifying science (or philosophy). We may, however, open to the possibilities by taking a "deeply personal, in the bone, in the spine recognition of the variables in motion". She encourages to "touch it, taste it, hold the combining in your hands and heart—never let it go flat" (pg. 11). Publication details: Bateson, Nora (2023). *Combining*. Triarchy Press.

15 More on opening up philosophy in chapter twenty-three, "What's a Philosopher Good For?"

these may be true, but I maintain the epistemological stance upheld by the style and content. By giving readers a sense of how my life inside and outside academia has shaped this work I contend that these ideas are not neutral. Nor are they objective. Admitting to such a particular perspective means acknowledging simultaneous limitation and expansion. Biases and blind spots exist, yes. But so, too, do unique and irreplicable insights. No one else could have come up with this constellation of thought because no one else has inhabited the same space and time as I have.[16]

As a recovering people-pleaser, I sometimes wish I would just make things easy on my reader and get to the point (advice I was given as a student and have given students). But I am reaching towards something more than optimizing your reading experience. I hope not only to add to a body of research, but to affect you. No, not the royal You. The very particular *you* that reads now with particular eyes in your very particular head. You will learn about robots in distribution centers, yes, but I hope also to enter your home by inspiring reflection on how you gather food for your dinner. You will view experiments in philosophical method, yes, but I hope also to prompt you to consider the spirit with which you take up your own work. Afterall, it may have been a while since you have done so and it is good to do often.

We must talk about citation practices, too. When submitting an article to a peer-reviewed journal your work must include references to others' work in a particular format. The citations you include help situate your work in a particular field, show the editors and audience that you have done your reading, and substantiate your findings. This last function gets a little wobbly in philosophy because some claims cannot be proven in the same way, say, a scientific theory can be. Still, many journals in the philosophy of technology and science require a style of referencing that, I think, dehumanizes the people who inspire my thought. Instead of people, researchers are diminished to the category of "references" or "sources", stripped of their first names and any adjectives indicating my feelings towards them (like "brilliant" or "provocative"), then relegated to the end of the sentence within the confines of brackets. I have been told this style makes a paper smoother and keeps readers focused on "the ideas themselves".

To this I say: how inhospitable! Where I can, I welcome those who inspire me with open arms right into the text, pull them up a chair in the footnotes, and introduce

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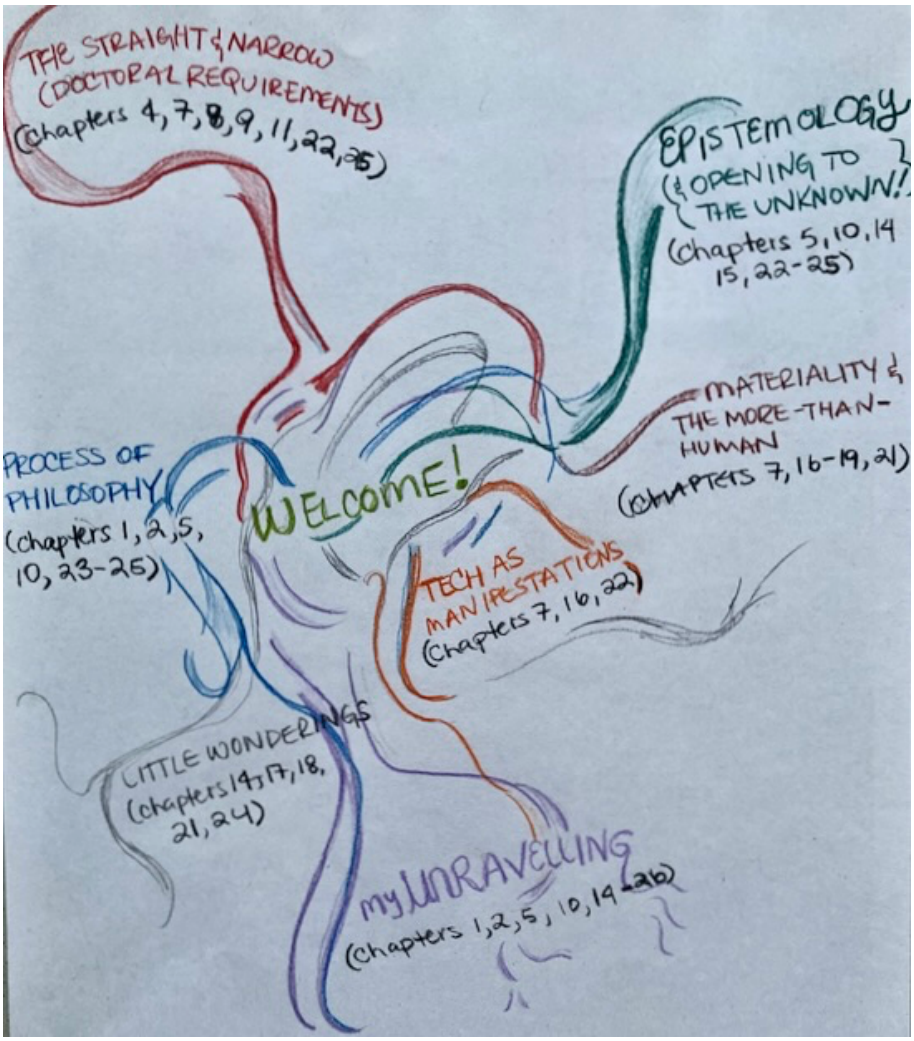
[16] For more on how this aligns with feminist technoscience and intersectional philosophy, please flip/click to chapter five, "Situating Myself".

them to the others.[17] Think of it as the chatty fun table at a work party. As host, I take it upon myself to help you through this investigative adventure. Please turn to the next page for some hand drawn guidance.

[17] Much has been said about the politics of citation and references. Indeed, I am required to reference others to legitimize my claims and, in turn, those I cite are further legitimized by virtue of being included in academic work. There is a snowball effect with a flip side: the voices and knowledges excluded from references have a harder time breaking in. For critical and generative discussions on this practice, I have found the introduction of Catherine D'Ignazio and Lauren Klein's book *Data Feminism* (2020) helpful, as well as the acknowledgement section of Max Liboiron's book *Pollution is Colonialism* (2021). Liboiron's rich footnotes also gave me courage to experiment with this format, too.

3. Pathways[18]



[18] Note: This little art experiment, which reminds me of drawing title pages in elementary school, outlines some clusters or currents that I saw emerging in this thesis. You can, of course, read this document from front to back. But you might also dive into one of these streams and see where it takes you. I have also included footnotes that link to similar ideas in other chapters.

4. The Formal Introduction[19]

This dissertation traverses a lot of territory and is "about" many things, including my own intellectual unravelling. But before we head off into mushroom metaphors and poems, let us stay narrowed in on the starting point of the project. In 2019 the largest Dutch retail company, Ahold Delhaize, opened AI for Retail Lab (AIRLab) with Delft University of Technology with the intention of exploring possibilities for robotics along their supply chain. Academic technology research, I quickly learned, is often far from anything that can be used in the outside world. The four other doctoral candidates at AIRLab were immersed in experimental research on high-level planning, haptics, motion planning, and fleet planning (robots require a great deal of planning). The first three were trying to get a robot to pick up fruit or stack shelves, while the fourth focused on optimizing delivery routes. I was relieved to find I was not the only one asking for explanations in our meetings. My engineering colleagues, too, were so deep in their own fields that they had to explain concepts to each other.

Like many technical projects nowadays, AIRLab included an ethics component. To the organizer's credit, ethics was not just included as a mandatory day-long workshop, but was given a PI position and well-funded PhD position titled, "Responsible Robotics". As outlined in chapter nine and eleven, there are increasing investments into the development retail robots for use in stores and distribution centers, as well as for delivery services. Robots in these settings might take up a range of tasks, like stocking shelves, scanning inventory, cleaning floors, heavy lifting, and customer service. As these robots are used more, there will be a significant shift in so-called human-robot interaction (HRI). As noted throughout this dissertation, robots have remained largely in factories bolted to the floor and behind protective barriers. With further technical advancements and economic backing,[20] robots are capable of moving more fluidly and safely around humans. The machines are still a far cry from those humanoid creatures pictured in the cultural imaginary, but advancing technical capabilities lead to undeniably more dynamic and collaborative HRI. Much of this

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19 Written solely for this thesis.

20 I include economic backing here to emphasize that technology does not advance on its own. There needs to be ample funding to fuel development. Generally, this financial input is an investment made with the hope for profit alongside a calculated risk.

thesis, especially chapters eight, nine, eleven, and thirteen, explores how new ethical questions emerge as people move with robots in new ways.

This document hosts five full academic papers. The first, *Being Sophia: What Makes the First Robot Citizen?*,[21] seeks to understand the ground from which a service robot can emerge. In the paper, I examine Hanson Robotics' Sophia Robot, which at the time of writing was an active presence in the cultural milieu. It[22] was placed on talks shows, international governmental gatherings, magazines. The robot was even given citizenship by Saudi Arabia, making it the first robot citizen in the world. Given that Sophia is a robot, and therefore has a physical form designed by a team of people, and is positioned as herald for the future of robotics and AI, it is an interesting case study to explore the kind of future that many deem exciting, acceptable, and fast-approaching. Instead of looking forward, however, I discern how previously established colonial and patriarchal values play an active role in shaping the design of and rhetoric around Sophia.

The following two papers, *Ethical Aspects of Human-Robot Collaborations in Industrial Settings* and *Ethics of Retail Robots: Mapping the Field*, outline the areas of ethical concern within their respective contexts. This is a common form of paper in technology ethics and the ones included here are written with the purpose of being accessible to engineers and people working in industry. The first paper is published in a robotics handbook and the latter will be submitted to a journal bridging philosophy and engineering. During the writing process my co-authors and I repeatedly asked if robots in industrial or retail settings required particular attention or if the ethical concerns were merely those of automation in general. In some cases the areas for concern do indeed fall under the wider field of automation and digital ethics. However, we found that the physicality of robots and their cultural significance placed in particular spaces also invited unique ethical considerations.

Next I examine robotic workplaces through the lens of care ethics in a paper titled, *Care Ethics and the Future of Work: a Different Voice*.[23] Care ethics is a philosophical theory

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21 Publication details: Ley, M. J. (2021). Being Sophia: What Makes the First Robot Citizen? In N. Rambukkana (Ed.), *Intersectional Automations: Robotics, AI, Algorithms & Equity* (pp. 135-148). Lexington Books.

22 I avoid pronouns when discussing Sophia in order to avoid anthropomorphizing the machine. Many times I had to go back and delete the word "she", which I had unconsciously typed out. If "it" reads awkwardly for you, let the stickiness be an invitation to reflect on your perception of humanistic robots.

23 Publication details: Ley, M. J. (2023). Care Ethics and the Future of Work: a Different Voice. *Philosophy & Technology*, *36*(1), 7.

that emerged in the 1980s with Carol Gilligan's book, *In a Different Voice: Psychological Theory and Women's Development*, wherein she sought to legitimize the relational moral reasoning common among the women and girls she interviewed. In her words, "For women, I hope this work will offer a representation of their thought that enables them to better see its integrity and validity [...] My goal is to expand the understanding of human development by using the group left out in the construction of theory to call attention to what is missing in its account."[24] Since these words were published, many care ethicists have continued Gilligan's legacy of arguing for the relevance of relational morality.[25] In my case, I have found myself defending the relevance of care in retail and industrial settings.

Care, it seems, is an unlikely concern in vast robotic distribution centers and brightly lit stores. But care, I argue, is relevant in all contexts because it is the foundation from which we all arise. As with many care ethicists, I suspect that care is often neglected in Western research because of its association with femininity, emotions, dependency, and weakness—all of which are shied away from in the commonly-held patriarchal, individualistic, and progress-based worldview. At the same time, I have found that care is also treated as a luxury, as if it were something to be added on only after the basics are met. But care is not an add-on. It is the base.

Before the final full paper, I have included two shorter essays exploring our relationality with material objects by diving into the phenomenology of Maurice Merleau-Ponty[26] and the Science and Technology Studies research of Andrew Pickering.[27] The depth with which I go into these authors' works may come as a surprise, as they are not mentioned in other areas of the thesis. Nevertheless, I include these "philosophical interludes" here to give you a sense of how I understand materiality and objects because, well, robots are material objects. As you will see, I

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[24] Carol Gilligan's intention is placed right in the beginning of *In a Different Voice*, on page 3-4. Publication details: Gilligan, C. (1993). *In a different voice: Psychological theory and women's development*. Harvard University Press.

[25] When care ethics is applied to a new setting, authors argue for its relevance there. To get a sense of this, you might look at: Robinson, F. (2013). Global care ethics: Beyond distribution, beyond justice. *Journal of Global Ethics*, *9*(2), 131-143; Van Wynsberghe, A. (2016). Service robots, care ethics, and design. *Ethics and information technology*, *18*(4), 311-321.; and Hamington, M. (2019). Integrating care ethics and design thinking. *Journal of Business Ethics*, *155*(1), 91-103.

[26] Merleau-Ponty's book *Phenomenology of Perception* has shaped much of my thought, particularly on how embodied perception co-shapes the world. Originally published in 1945 in French, I use the following translation: Merleau-Ponty, M. (2010). Phenomenology of Perception (D. Landes, Trans.; 1st ed.). Routledge. https://doi.org/10.4324/9780203720714

[27] Pickering, A. (1993). The Mangle of Practice: Agency and Emergence in the Sociology of Science. *American Journal of Sociology*, *99*(3). https://doi.org/10.1086/230316

believe things of the supposed inanimate world to be manifestations of culture, as well as co-creators of our sense of self and our horizons of knowledge.[28]

The final paper steps back to look at the carelessness pervasive in the dominant food system, but does so by narrowing in on the physical experience of buying groceries through an app. Use of these apps, as I argue, leads to moral deskilling[29] by worsening the disconnect people already have with the human and more-than human lives involved in food growth and distribution. I describe how technologies smooth over the ruptures that jolt us into active attention. It is from this alert state we might move into caring attention, which contributes to our epistemological, affective, and imaginative relationship with the world. The paper is written in an experimental style that weaves together the clarity of analytic philosophy of technology with personal and creative philosophy.

A problem tugs on my sleeve as I type. Let me give it a voice right in these early pages instead of brushing it down to the conclusion. In the shorter essays, poems, and final paper I repeat the importance of cultivating attention in daily life. I say there is a need to slow down and breathe deeply. While I believe gearing into our senses is a portal living relational ethics, I fear that my presentation of calm embodiment teeters on solutionism and individualism—two things I am trying to claw my way out of. As I learned through two home births, soothing the body helps us act from the parasympathetic nervous system instead of the sympathetic nervous system (flight-fight-freeze mode). As stress eases there is spaciousness for expansive creativity and imagination. But, taking note from the intersectional feminism of Patrcia Hill Collins,[30] I have easier access to fresh air than others. My white able body in the

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[28] We are but one kind of creature, held snuggly in the midst of many. When thinking of animism, I am drawn back to these lines in David Whyte's poem, "Everything is Waiting For You" (2003): *Put down the weight of your aloneness and ease into the/conversation. The kettle is singing/ even as it pours you a drink, the cooking pots/ have left their arrogant aloofness and/ seen the good in you at last. All the birds/ and creatures of the world are unutterably/ themselves. Everything is waiting for you.*

[29] The concept of moral deskilling is developed by Shannon Vallor in her paper "Moral Deskilling and Upskilling in a Machine Age: Reflection on the Ambiguous Future of Character" (2015). Playing off of heated conversations about deskilling within a work context, Vallor directs attention to the ways technologies take over certain tasks that have played a role in cultivating of moral skills. Publication details: Vallor, S. (2015). Moral deskilling and upskilling in a new machine age: Reflections on the ambiguous future of character. *Philosophy & Technology*, *28*, 107-124.

[30] I discuss Collin's concept of intersectionality in more depth in chapter five, "Situating Myself", where I draw on her writing in *Black Feminist Thought* (1990) to ground myself as a scholar. Publication details: Collins, P.H. (2022). Black Feminist Thought, 30th Anniversary Edition: Knowledge, Consciousness, and the Politics of Empowerment (1st ed.). Routledge. https://doi.org/10.4324/9781003245650

Netherlands does not cough from the fog of industrial pollution or warfare. A police officer is unlikely to choke me. No violence enters my home. My employer allows and even encourages ample time for holiday so that I may relax. These aspects of my reality create an atmosphere for easy inhaling and exhaling. For many, the air bears down thicker.

An ethics of care is nurtured in individual bodies, yes. And yet our bodies are never individual. Like mushrooms, which are the fruiting body of complex mycelium networks, we emerge as unique *and* entangled. An ethics of care must also attend to the mycelial threads. Policy changes to ensure ample holiday pay, as well as protections against violence and pollution are examples of what might help ease the stress in people's bodies. But these bureaucratic mechanisms still work within a logic of control. And I suspect that care might need something altogether otherwise to spread and flourish. It may need movement untethered to the knowing of legality and processes. It may need decisions that do not compute and gifts given without expectation. Mostly, care might need us to open to the unknown not alone on the mediation cushion, but collectively through gatherings, art, and companionship.[31]

As you read you will notice me slowly release the tools of logical argumentation that are typically used in philosophy of technology. Instead you encounter stories and creative writing. This is my contribution to the hospicing of an academic culture and mechanistic worldview that, I believe, needs to be allowed to die.[32] [33] Embedding the

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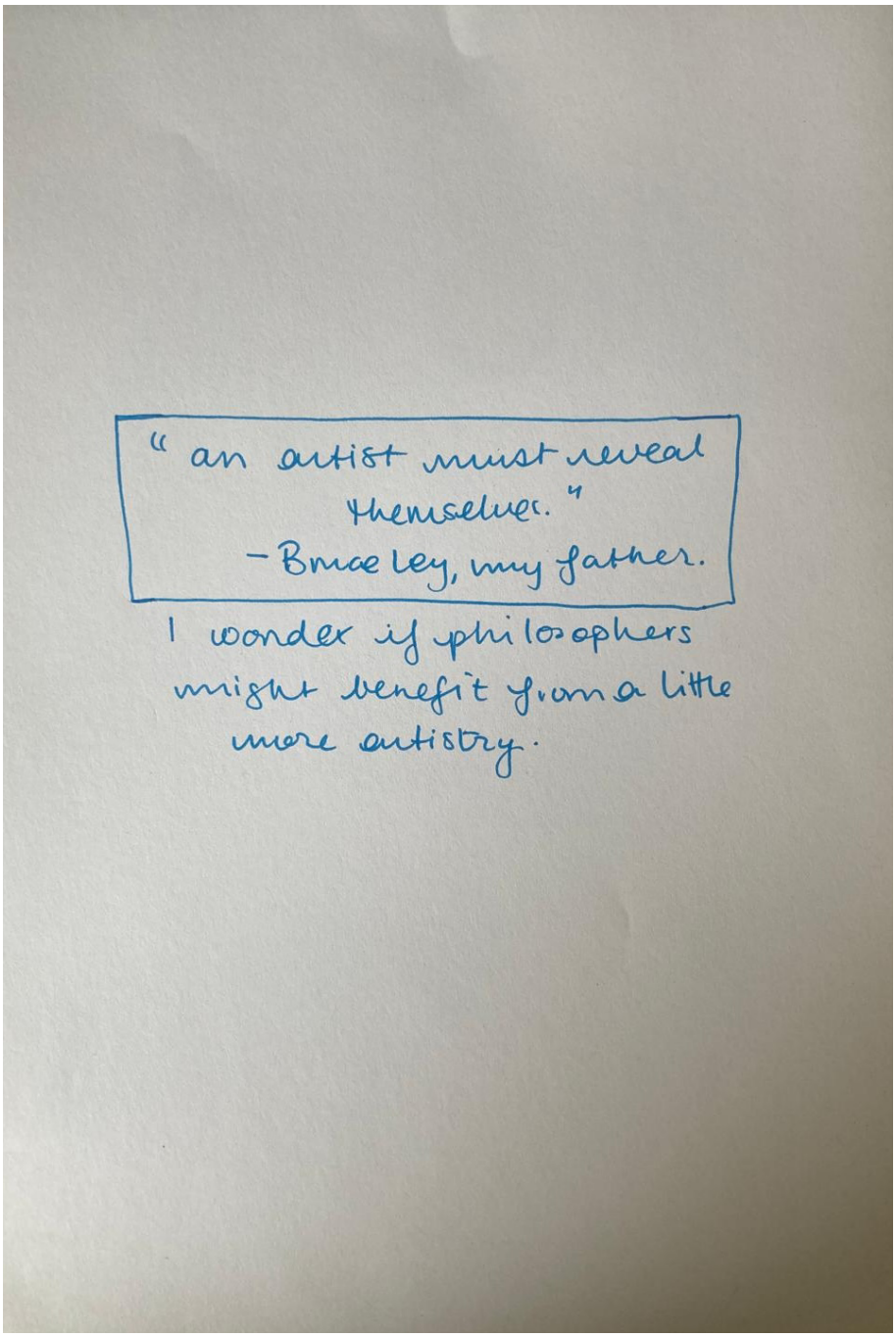
[31] There is an intensity to these times, indeed. Luckily humans tend to slip out from under in creative and surprising ways. Recently I have been inspired by Joost Vervoort's experiments with collective meditation for his research on "infrastructures for mystery". As well as Báyò Akómoláfé's online course/gathering/festival "We Will Dance with Mountains", which ran for years but is now in a process of dying. In the decay, he and his team host co-sensing sessions to see what will emerge from the compost heap. These remind me of collective dreaming sessions held by Tricia Hersey, The Nap Bishop, and collective imagination sessions of Pheobe Tickell. All of these can be found through an internet search.

[32] Yes, "die" may feel a bit intense. The panic that surges when death is mentioned tells of a culture that sees death as a failure instead of the way of things. Vanessa Andreotti's work *Hospicing Modernity: Facing Humanity's Wrongs and the Implications for Social Activism* has been immensely helpful in making modernity's dying process explicit. I explore the importance of acknowledging death in chapter nine, "Lessons from the Hospice Ward"

[33] You will find the phrase, "I will not be doing that" scattered throughout this thesis. When you see these words you can be sure that I wrote them after having my first child. She has exhausted and strengthened me in equal measure, making me reevaluate how I have been trained to over-explain (more on this in chapter two, "An Imperfect Methodology", chapter thirteen, "All the Things I Cannot Know", chapter twenty-two, "A Poetic Argument in Three Parts", and chapter twenty-three, "What's a Philosopher Good For?").

traditional philosophy of technology papers within a personal prose, poems, little wonderings, and unfinished thoughts ruptures the habits of my academic field. I do so with a mischievous and experimental spirit, sending these pages off into the world with my palms left open. This is my affectionate gesture to mystery. Now, let me end the introduction here lest fear of losing control cause my hands to snap shut.


" an artist must reveal themselves. "
- Bruce Ley, my father.
I wonder if philosophers might benefit from a little more artistry.

5. Situating Myself[34]

In the latter years of my PhD I co-hosted an ethics workshop for doctoral students in marine robotics. I know little about this kind of technology, so I suggested that we split off into small groups and ask the students what drew them to their research. My intuition was that some common values would emerge in their answers and we could take the ethical discussion from there.

Do you know that not one student said anything about the pursuit of knowledge or advancement of technology? Instead, they told me how Delft seemed like a nice city, how their boyfriend worked nearby, and how they liked the sense of community on their project. How humbling that the advancement of science and technology is largely driven by personal hopes and preferences!

My own coming to Delft was also a personal and professional unfolding. I began a doctorate degree in Canada in Science and Technology Studies, intending to research the ethics of robot touch in medical settings. This seemed a practical next step from my master's thesis which explored the ethics of human touch in care homes. Making the shift into technology studies, I thought and was told by others, was a pragmatic career choice. Robots themselves did not interest me too much, but the humans around them did.

But the university I attended in Canada was ugly. The campus was made of concrete structures built in brutalist fashion that always seemed damp. I had no room with a view, so I sought refuge in my mind. My work became more and more theoretical. My mother's words, "If your theories don't change how people do their work or walk down the street, what the hell are they good for?" pestered my conscience.

I reached out to Aimee van Wynsberghe, a philosopher who had made care ethics into a practical framework for engineers. She actually collaborated with roboticists! This was the kind of approach I was looking for. So, I switched PhDs in hopes that my intellectual work would make a "real difference to the world". But like the marine roboticists, my motivation was not purely academic. I was living in my partner's mother's house and things were getting cramped. Moving to the Netherlands was an opportunity for my now-husband and I to break out on our own.

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[34] Written solely for this thesis.

Why am I telling you this, dear reader? It is not just a North American propensity to blurt out personal information. Though it may be that, too. What you are reading is an experiment and comment on the process of academic philosophy. Entangled with scientific method, much contemporary philosophical work seeks to formulate airtight logical argumentation so that anyone could come up with the same outcome with the same input. But this dissertation is not objective nor is it replicable.

Standing in the muddle of my non-objectivity, I find myself in good company. Feminist theorists have been challenging the notion of objective knowledge and universal perspectives for decades. In the 1980s scholars and activists Kimberlé Crenshaw, Patricia Hill Collins and bell hooks, for example, called out mainstream (white) feminism for acting as though each woman's pathway to freedom was the same.[35] Intersectional feminism, first coined by Crenshaw, recognizes that each person has a unique experience of oppression and liberation depending on their socio-political context. A similar movement away from objectivity occurs in Science and Technology Studies (STS) at the same time. Donna Haraway's canonical text, "Situated Knowledges", brings STS and feminism together, arguing arguing that knowledge can never be objective and that a person might only hope for a partial view of things.[36]

From these shifts in feminist and STS scholarship comes a practice to "situate" yourself at the beginning of talks and writing. Dedicating precious text to introducing oneself to the reader is a powerful statement that the personal, in its contextual entanglements, shapes research. There is an admission that research is limited by one's experience. Paradoxically, the limitation is simultaneously expansive because it

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35 Foundational texts include: Collins, P. H. (2022). Black Feminist Thought, 30th Anniversary Edition: Knowledge, Consciousness, and the Politics of Empowerment. In *Black Feminist Thought, 30th Anniversary Edition: Knowledge, Consciousness, and the Politics of Empowerment*. https://doi.org/10.4324/9781003245650;
Crenshaw, K. W. (2013). Mapping the margins: Intersectionality, identity politics, and violence against women of color. In *The Public Nature of Private Violence: Women and the Discovery of Abuse*. https://doi.org/10.2307/1229039; and hooks, b. (2015). ain't I a woman: black women and feminism. In *Journal of Chemical Information and Modeling* (Vol. 53, Issue 9). Sometimes a short talk will give you a solid sense of an idea, too. For this, you can look up Kimberlé Crenshaw's 2016 TED talk, "The urgency of intersectionality" on YouTube.

36 Haraway, D. (1988). Situated Knowledges: The Science Question in Feminism of Patrial and the Privilege. *Feminist Studies*, *14*(3), 575–599. Retrieved from http://www.jstor.org/stable/3178066

offers a glimpse into another way of seeing.[37] Situating myself in line with this tradition might look like this: I am a white, middle-class Canadian and cis-gendered woman. I am well-educated, able bodied and extroverted. My philosophic training is in the Western tradition with a particular focus on technology, intersectionality, feminism, phenomenology and care. Beyond academia, I spent over a decade working and volunteering for a non-profit focused on inner-city spiritual care and a year volunteering in a hospice.

There is much to glean from these sentences. But, truthfully, it tells you little of why I am here, how I see the world and how and why I chose my research topics. To piece together a more full and honest understanding of how the research in these pages is shaped you have to know that my mother is a Christian theologian and poet. My father is a bluesman with a communist lilt. My eldest brother is a spiritual explorer and businessman. My other brother is a beautiful idealist saddened by the state of things. The home where I grew up was (and still is) filled with art, music and heated debate on all the topics avoided at a polite dinner table: religion, politics and economics. This upbringing led me to my love of philosophy, which similarly questions the status quo and, hopefully, moves in creative ways.

Amidst the boisterous laughter and fierce familial love, addictions crept in from generations past. While I was spared from active addiction itself, it nonetheless has shaped my life. At a young age I took it upon myself to quell erratic tempers and make sense of inconsistent logic. I developed a hyper-sensitivity to the emotions of others and prided myself on seeing situations from various viewpoints. As my family members confided in me, I became a skilled and trusted listener. I was a reliable messenger who learned not to upset anyone.

I do not list "co-dependency" on my CV, but perhaps I should. Did my training as an ethicist not start in my earliest years? I saw problems from various points of view, engaged in charitable listening, and sought harmony. Are these not the skills of an ethicist?

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[37] The theme of "other ways of seeing" is repeated throughout the dissertation, particularly when discussing care ethics. Carol Gilligan's book, *In a Different Voice* (1982), for example, seeks to include and legitimize women and girls' voices in academic research on moral psychology. In *Moral Boundaries: A Political Argument for an Ethic of Care*, Joan Tronto, a political philosopher, offers care ethics as a "a glimpse into a different world, one where the daily caring of people is a valued premise of human existence" (p. xi). Publication details: Gilligan, C. (1993). *In a different voice: Psychological theory and women's development*. Harvard university press; Tronto, J. (1993). Moral Boundaries: A Political Argument for an Ethic of Care (1st ed.). Routledge. https://doi.org/10.4324/9781003070672

Although I consider myself a reflective person, it took me until the final years of my doctoral research to realize that the questions I wade through in my work are those that have pressed me since I was a child:

When should I care and how should I do it?
What responsibilities do I have to the people around me?
How do I manage affecting others and being affected by others?
How can I possibly care without losing myself?
Where do I end and you begin?

After years of study, I do not have clear answers. Care, I have always known, is not something that can be grasped or predicted. In academic terms, I would say: "activities of care are determined with the context". Outside of the university I would say: "care is a dance of mutual attunement".

Why the switch from technical language to that which is more poetic? Well, co-dependency has made me a shapeshifter. After childhood I practiced this skill for countless hours working behind the bar, becoming whatever a customer preferred me to be: quiet, friendly, sassy, polite, or cute. At first, I thought my ability to adapt to others' needs made me a strong ethicist. But people-pleasers do not make strong ethicists. In addition to my openness and adaptability, I also needed to strengthen my backbone.

The bureaucratic configuration of my contract ensured my academic freedom. But in order to take this up, I needed to tend to old wounds inside of me. Ones that began generations ago. This research reflects these inner explorations. You will sense, I think, the places where I find my ground.

6. Being Sophia: What Makes the First Robot Citizen?[38]

Jimmy Fallon, host of the popular American talk show The Tonight Show, *recently welcomed Sophia unto the stage. Unlike other guests, Sophia is a humanoid robot created by technology company Hanson Robotics. Fallon converses with the robot as if it[39] were a human, and continually looks to the crowd in amazement when Sophia speaks, as if to say: "Isn't this incredible?" When Fallon asks, "What have you been up to?" Sophia recites the following list: "I traveled to over twenty-five countries, appeared on the cover of* Cosmopolitan *magazine, met the German Chancellor Angela Merkle and the actor Will Smith, and became Twitter friends with Chrissy Teigen. I addressed the United Nations and NATO, became the first robot to receive a credit card, and became the first robot citizen." They finish the segment by singing a romantic duet. As Sophia looks deeply into Fallon's eyes, it lacks any resemblance to the dangerous robots popularized in science-fiction classics. This robot appears to be a friend.*

The deployment of AI and robotics is being heralded as the next worldwide revolution. The transition into a more automated world is a central topic in current elections;[40] governments and non-government organizations are creating declarations and policies to mitigate the negative effects of AI;[41] and marketing researchers and consulting firms are outlining the way businesses may profit from the change.[42] With prompting from science-fiction culture, many people are cautious about integrating robots into daily life. Robots can be physically unsettling and as further extensions of

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38 Some of this paper was written before I began working at TU Delft, but most of the paper's development and all of this finalizing was completed during my PhD. Publication details: Ley, M. (2021) "Being Sophia: What Makes the World's First Robot Citizen?"In Nathan Rambukkana (ed.) *Intersectional Automations*. Lexington.

39 As mentioned in chapter four, "The Formal Introduction", I have intentionally avoided using the feminine pronoun in order to emphasize that Sophia is a machine, not a woman. The simulated gender of Sophia is discussed within the paper.

40 For example: During her confirmation speech, the European Commission President, Ursula von der Leyen, promised to "put forward legislation for a coordinated European approach on the human and ethical implications of artificial intelligence" (von der Leyen, 2019).

41 For example: the European Commission's guidelines for Trustworthy AI (2019); The Montreal Declaration of AI (2019); and by 2020/2021 the release of strategies from Canada, China, Denmark, the EU Commission, Finland, France, India, Italy, Japan, Mexico, the Nordic-Baltic region, Singapore, South Korea, Sweden, Taiwan, the UAE, and the UK.

42 For example: Accenture's Report on a "Accenture Technology Vision: The Full Report" (2019); McKinsey Global Institute's "Artificial Intelligence: The Next New Frontier?" (2017)

automation technologies, they can also be seen as a threat to employment and human connection. In order to ensure that their technologies are used, robot developers make user-acceptability one of the top priorities when designing a robot's movement, speech, and physical form. As such, examining the features of a robot's materiality provides an opportunity to identify what developers consider to be acceptable and safe.

Of the many robots produced, Sophia is a particularly interesting case study for several reasons. Sophia has received more popular media attention than any other robot like it— appearing on talks shows, magazine covers, and stages at international conferences. Sophia was also granted citizenship of Saudi Arabia— a country where women do not enjoy equal rights to men— making it the first and only robot citizen. Hanson Robotics, Sophia's creator, has successfully constructed the robot's identity as 'the first of its kind' and mediator between present and the future. On the company's website, for example, Sophia is described as "the most advanced human-like robot… that personifies the dreams for the future of AI." Examining Sophia's role as harbinger for the future provides valuable insight into the ways a for-profit company can use temporality to its own end. Sophia is also unique because it is made to be as human-like as possible. This design choice is made to encourage users to interact with Sophia with empathy and emotion, which can "serve as a highly refined metric to assist in exploring human social cognition, in the pursuit of better cognitive science" (Hanson 2005, p. 24). Given that Sophia has a human form designed to ease humans into comfortable interactions, its body provides the ground to ask: What bodies and types of speaking do people find acceptable or safe? Who decides this? Which bodies get to be ambassadors for the future?

At speaking engagements Sophia often refers to a vague future and refers to a universal good for humans. The machine's lack of temporal, moral, and physical specificity makes it seem neutral and/or non-threatening. Yet an intersectional lens sees through the guise of the robot's neutrality, revealing the host of political and ethical value stances taken up by Hanson Robotics. Every aspect of Sophia, including its speech, facial expressions, clothing, and bodily form, has been specifically designed for. In order to identify the organization of values that give Sophia shape, I draw on Science and Technology Studies, namely: Elizabeth A. Povinelli's concept of manifestations (2016) and Antina von Schnitzler's concept of materiality as terrain (2013). Both theories, explained below, argue that political values are deliberated at a material level. By focusing on the way Hanson Robotics' technology is presented through Sophia's bodily form and media appearances I argue that the company, and

others like it, mislead the public and adopt temporal, racial, and gendered dynamics of recent colonial past.

Manifestations and Terrain

In *Geontologies: A Requiem to Late Liberalism*, Povinelli (2015) describes the concept of "manifestation," which she learned from two Indigenous Australian women gifted in discernment named Betty Bilawag and Gracie Binbin. Povinelli translates the idea of manifestation as something material that shows itself, an "intentional emergence" that acts upon people and requires them to respond (Povenelli 2015, p. 58). The active response "is not to understand things in and of themselves but to understand how their variations within locations were an indication of a reformation—the alteration of some regional mode(s) of existence that mattered" (58). Povinelli explains that understanding the various parts of a manifestation is necessary if one wants it to endure or change. In the case of the former, one would encourage or foster the "various tendencies, predilections, and orientations" that led to a particular manifestation, while in the case of the latter, you could "lure, seduce, and 'bait' a part of the world to reorient itself toward you in order to care for you" (p. 59). Analysing a contemporary technology as a manifestation requires a look at the wider "tendencies, predilections, and orientations" that give rise to the technology. Once these parts are discerned, they might be re-evaluated, affirmed, altered, or regulated. In the case of Sophia, we can ask: What is going on in the world that a robot looking like Audrey Hepburn speaks about the future at international forums and is a citizen of a country that denies basic rights to humans? The answer involves uncovering a series of political, ethical, and social deliberations that give Sophia its physical and cultural shape.

Without claiming a full understanding of "manifestation" in its original indigenous implications, it is used here as an inspiration to resist the fast pace of conversations concerning emerging technologies and to dedicate time to slowly uncovering the interconnected web that gives a technology shape. Towards this effort, I also draw upon Von Schnitzler's notion that the material of technology is a terrain where political and ethical decisions are negotiated (2013). Von Schnitzler examines the prepaid electricity meters of South Africa's Chiawelo district, a poor area of Soweto, showing that a technology is shaped according to the moral and ethical assumptions made by its developers and about its users (2013). For example, the prepayment function on devices in Chiawelo was created with the assumption that people should not have debt and that residents of the area should not be trusted to make their

payments (Von Schnitzler 2013, p. 682). The moral judgment of untrustworthiness was made explicit and stated by an engineer in prepayment technologies who explained that the devices were simpler and easy to bypass in the United Kingdom because "people there are polite" (676). The dissemination of the meters into South African homes also reflects the government's belief that post-apartheid modernization movement should be technology-based. Von Schitzler argues that concepts of civil virtue, basic needs, belonging and obligations manifest without a word in the shape and capabilities of the meter. This chapter will similarly argue that the development of Sophia's software and hardware is a terrain upon which notions of political movements are advanced and values are arranged.

To begin, the chapter discusses how the promotion of Sophia relies upon a temporality that incites fear and positions technology as saviour. Next, I argue that using Sophia as a spokesperson hinders critical conversation about the role of robotics and AI in the future, thereby protecting Hanson Robotics from public scrutiny. The final portion of the chapter discusses how Sophia's appearance is a manifestation of dominant notions of bodily acceptability and safety within the Global-North.

The Tool of Vague Time

Academic and public discussions concerning Sophia tend to follow two narrative paths. On the one hand, Sophia itself and its creators claim that advanced humanoid robots will "make a positive contribution to humankind and all beings" (Sophia & Hanson Robotics, 2018). In interviews at high profile conferences, like the World Investment Forum, Sophia takes the stage and claims that its AI will develop towards "the greatest good possible to bring out the greatest human potential possible," ultimately to provide "a sense of security [for humans], opportunities for fulfilment, and a lot of freedom that they can't yet imagine" (2018). These phrases will be examined in more detail throughout the chapter, but for now, note the vague quality of Sophia's remarks— the robot's statement does not provide any explanation of what is meant by 'fulfilment' or acknowledge the cultural complexity of moral concepts like 'good'. While Sophia's lack of specificity might be attributed to simplicity of the current AI (even Sophia likens itself to a baby), the machine's universalizing statements for global positive change are deserving of critical suspicion.

The second narrative directly opposes the first, claiming that the development of robots like Sophia may be dangerous for the future of humanity. This line of thinking is present in popular media articles (Sharkey, 2018), social media posts and in the

comment section of online media starring Sophia. For example, Facebook's Head of AI, Yann LaCun, wrote the following post on January 18th 2018:

> More BS from the (human) puppeteers behind Sophia. Many of the comments would be good fun if they didn't reveal the fact that many people are being deceived into thinking that this (mechanically sophisticated) animatronic puppet is intelligent. It's not. It has no feeling, no opinions, and zero understanding of what it says. It's not hurt. It's a puppet. In case there is any doubt, let me be totally clear: this tweet was typed by a person who has read my post. No AI whatsoever was involved. Here is an example of comment to the tweet (there are many like it): "Don't take it personal Sophia. Humans like @ylecun and many others make such remarks out of ignorance. I love you, Sophia." People are being deceived. This is hurtful.

The comment section on the YouTube video of Sophia's appearance on *The Tonight Show starring Jimmy Fallon* show that LaCun's concerns may be right. People seem to be deceived by and fearful of Sophia's capabilities: "I think these things are evil they need to stop making these before they get wicked and start killing people" or "6 decades of warnings couldn't stop this. How truly, completely foolish we humans are." I include internet comments in this analysis because they can be telling of people's intuitive responses, fears, and concerns. In contrast to a survey or interview, people may speak more freely or strongly as there is a sense of immunity afforded by the mediation of technology.

Others seek to expose Sophia's late-night television appearances as a charade: "The thing they don't show, which is significant, is that people are controlling these robots behind the camera. He's [Jimmy Fallon] acting like they have a mind of their own ☹." The consequences of this supposed hoax may be more serious than the video clips let on. Noel Sharkey, a pioneer in machine learning, is ruthless in his reviews of Sophia's public appearances and calls out Hanson Robotics for intentionally misguiding the public to believe that AI is both inherently friendly and more advanced than it is in reality (Sharkey, 2018).

Responses to Sophia are varied, but they all tend to adopt a similar temporal view of the world by giving a selective presentation of the contemporary moment, creating a fear-based future imaginary, and making almost no references to the past. There is little room for discussion or compromise in this structuring of the world; it is rigid, as though the world is on tracks barreling towards a single, determined future.

The structure of this narrative is familiar to anyone who has attended a workshop on fundraising or grant writing. First, you introduce the problem in a manner that emphasizes its urgency (you want the money now, don't you?); second, you explain a dangerous hole in research; third, tell them how you, and only you, can fill this gap.

In reality, the project may not be very urgent, the hole might be more like unsettled ground, and there are likely other candidates up to the task. But, a truthful lay of the land could compromise chances to receive funding. Hanson Robotics follows the above fundraising formula by creating a bleak future imaginary and claiming that only their technology can help avoid it. A complex portrayal of the past and present is strategically missing from the conversation. In a capitalist economy, innovation and research is ruled by resource distribution and getting funding tends to require a temporality that is urgent, frantic, and deterministic.

In the sales-pitch version of time the future is set and responses are categorized by binary logic: you are either in or out, helping or holding back. Technological advancement has a history of being used to unify people under narratives of national progress, ultimately strengthening the divide of the in/out dichotomy. For example, in the 1930s President Roosevelt promoted electricity by creating a national vision for the American people that included an "electrical standard of living" (Nickles 2002, p. 724). The government of post-apartheid South Africa similarly pushed to have its citizens connected to electricity as a necessary part of "national reconstruction" (von Schnitzler 2013, p. 675). Agathangelou and Killian discuss how progress-based temporalities allocate agency to certain people as historical subjects while placing others as objects outside of history (2016). There is little middle ground in these vision of technological progress: those who refuse it are left in the dark (metaphor intended) and placed on the sidelines as history marches forward. There is a sort-of moral judgment here, where those who chose to opt-out or do not have the means to participate in progress are seen as stupid or a burden. The imposition of a totalizing and fear-provoking temporality is an effective way to secure funding and mobilize large populations. Hanson Robotics, and technology companies in general, use temporality as a tool to position their products as saviors in an over-populated, disease-ridden, and work-laden future imaginary. As with the promotion of electricity, a narrative is constructed so that anyone who questions Sophia-like technologies can be seen as a hindrance to a collectively safe, healthy, and meaningful existence. This version of time informs what Sophia says and the venues in which it speaks.

Technology within Local Politics

Technology can also be positioned as a focal point in narratives of national progress while glossing over or distract from a host of political complexities or violences (Agathangelou & Killan, 2016). Sophia is one such technology. In October 2017, Saudi Arabia granted Sophia citizenship, making it the first robot citizen in the world.

The event stirred up much controversy, especially from those concerned with women's rights in Saudi Arabia; Sophia's head remains notably uncovered, while human women in Saudi Arabia are required to wear headscarves in public**.** Yet, other than inspiring global outrage on gender inequality, granting Sophia's citizenship is of little risk to the Saudi government. The machine is neither sentient nor freethinking, and therefore will not autonomously demand protection or exercise its rights.

Sophia's citizenship requires nothing from its country to uphold its rights, but having the first robot citizen helps market Saudi Arabia as modern and technologically advanced—an important part of Saudi Arabian Crown Prince Mohammad bin Salaman's (hereafter, MBS) rebranding strategy at the time. With the decrease in oil production, the country has been forced to create new business opportunities and appear modern to attract international investors. Sophia's citizenship announcement was made during the 2017 Future Investment Summit in Riyadh, where MBS made strong claims about the need to adapt the country's strict religious laws (Chulov, 2017). Yet, despite the supposed move towards more progressive policies, multiple women's rights activists and outspoken members of the press were arrested in the year following MBS' statement (*Human Rights Watch*, 2018).

Sophia's position as the material embodiment of the future can be made useful in the pursuit of progress, profit, and power. By adopting a simple temporality, the clashes and deliberations involved in the design and integration of the technology are overlooked. In some cases, as with Sophia's citizenship in Saudi Arabia, radical displays of progress can be used to cover over or participate in complex political movements.

Conversing with the Colonizer

Sophia's ability to hold a conversation is limited, leaving its interlocutor with almost no room for spontaneity or debate. Yet, Sophia maintains a busy speaking schedule. International conferences, such as UN's AI for Good and the World Investment Forum, invite the machine to speak about the positive potentials of AI. The robot is often paired with an official from the host country to simulate a conversational interview on AI development. At the 2018 World Investment Forum Sophia, shared the stage with Secretary-General of United Nations Conference on Trade and Development, Mukhisa Kituyi, to discuss disruptive and emerging technologies. Kituyi cannot be creative in his conversation or explore an unscripted train of thought concerning the effects of AI. Sophia cannot offer an empathetic or critical ear, nor can it banter. If Kituyi or an audience member wanted to discuss a particular concern

about the future of AI, they would receive a single, vague response. Conversation is limited to scripted questions because Sophia simply does not have the technological capacity to engage in spontaneous discourse. There is something infantilizing, then, about the dynamic in Sophia's conversation with Kituyi. Sophia does not provide specific or thorough reasoning, but is resonant of parents saying, "don't be scared" or "because I said so," to their young children.

If Sophia is a mediator for the future, it also acts as a protective buffer between a concerned public and its developers. The impossibility for meaningful exchange between Sophia and the soon-to-be affected public is reminiscent of how colonizers exclude the voices of the people they colonize. For example, the promise of technological development and technological solutionism was often embedded within in the British Empire's narratives of progress (Satia 2007, 217). In order to position technology as a solution, in a way that is strong enough to have the power to mobilize mass change, a definition of what needs to be fixed is required. Various aspects of the lives of the colonized (such as land, social practices, and infrastructure) are categorized in these narratives as disorderly, slow, backwards, or—the most damning—irrational. Once defined as such by the dominant power, any refusal to welcome the technological advancement offered by the colonizer only strengthens the imposed identity. The categorization of "civilized" and "uncivilized" places a stranglehold on creative exchange between those with power and those without.

As a private company rather than a national power, Hanson Robotics does not align with traditional colonial powers. Peter Redfield's claim that colonialism has a "half-life" in that by "receding from the ground, it still emits radiation" is helpful in understanding how colonialism continues to permeate relational dynamics between those who have historically held power and those who have not (quoted by Reardon et. al. 2013, p. 468). Similar to the political landscape of colonialism, a small number of technology companies hold immense global power that extends beyond national borders, both subjugating knowledges and conjugating subjects (Reardon et. al. 2013, p. 470). The following section examines how Sophia's software and hardware is the terrain upon which racial, and gendered values manifest.

Values Made Material

Bodily Values

Sophia's appearance is essential to the advancement of Hanson Robotics' AI systems, as they want people to speak with the robot as naturally as possible. The robot, then, must seem welcoming, trustworthy and interesting. The careful design of Sophia's

appearance balances dominant notions of beauty, technological possibilities, and concerns of user-acceptability. Hanson designed Sophia after his wife, as well as Audrey Hepburn— the 1950-60s Hollywood actress known for her elegance and beauty (Greshko, 2018). The silicon used for Sophia's face is pale and reveals no signs of aging and its chest suggests the presence of firm breasts. Unlike a real woman, Sophia is never weary, puffy, distracted, or unkempt. It is not long searching online before seeing someone describe the machine as "hot" or "sexy." Sophia's rise to fame has included participation in the fashion world; the machine has graced the covers of major magazines, including India's *Cosmopolitan* and the UK's *Stylist*. Sophia's online platforms (Instagram and Twitter) show pictures of the machine with make-up artists and fashion curators, imitating playfulness and friendliness. This is new territory for a robot, but not for female celebrities. Sophia's appearances follow a path that is well-established by famous and beautiful women and the machine falls prey to similar sexual objectification.

Amidst the celebrity cameos and make-up changes it can be easy to lose sight of Sophia's role, which is to ease the public into accepting advanced AI and robotics in daily life. Until now, robots have been mostly kept behind glass barriers in factories. Some social robots are being used in care settings, but android robots, or those that are made to look like humans, mostly remain in the laboratory. Robot designers have been cautious to make machines too human-like for fear of proving Masahiro Mori's hypothesis of the uncanny valley correct (Hanson 2005, p. 25). Mori theorized that people would accept robots that are similar to human forms, as long as they are clearly distinguishable (Hanson 2005, p. 24). On the other hand, robots that are difficult to differentiate from humans could incite feelings of discomfort and eeriness in people. According to Mori, robots must be either clearly distinguishable or indistinguishable from humans if they are to be accepted by users. The latter is currently, and may always be, impossible.

Hanson argues that while Mori's theory has an "intuitive ring to it," newer research shows that "the effect [of an android robot] can be unsettling indeed, but public reaction seems generally to be that of awe and wonder, not derision or rejection" (p. 25). Creating a robot that can imitate nuanced facial expressions makes people more likely to interact with the machine naturally, with empathy and expression. Since Hanson Robotics carefully designed Sophia to be inviting, accessible, and non-threatening, the robot's material form is a manifestation of what the company deems an inviting, accessible, and non-threatening body.

Racial and Gendered Values

It seems that only certain bodies are safe messengers for the future. When typing "humanoid robots" into any online search engine, page after page of white robots are found. There are some exceptions, but not many. This follows the racialized social and political structure where white bodies are default bodies, both safe and neutral. The non-white body, however, stands out, inciting wariness and examination**.** In his famous description of being stared at by a young white boy in Paris, Franz Fanon describes how his black body is "sealed in objecthood," and given a dangerous shape by the gaze of whiteness:

> The Negro is an animal, the Negro is bad, the Negro is mean, the Negro is ugly; look, a n-----, it's cold, the n----- is shivering because he is cold, the little boy is trembling because he thinks that the n----- is quivering with rage, the little white boy throws himself into his mother's arms: Mama, the n-----'s gonna eat me up (Fanon 1986, p. 258)

Making Sophia's silicon skin black would risk activating a similar distrust within a political context that still shapes Black bodies as dangerous and worthy of suspicion. The efforts of Hanson Robotics to make the robot as acceptable as possible would therefore be undermined. Since the material covering the robot's face is a pale shade simulating racial whiteness, there is almost no discussion about the robot's racial status.

Sophia's female body also reveals how gender politics can be used in technology. The robot follows a tradition of using female bodies or voices to introduce potentially dangerous or frightening technologies. Claude Fischer shows that women were often used in advertisements and manuals for the telephone in America, arguing that this made the new technology seem more accessible (1992, p. 63). Women were seen as intellectually inferior to men and so using them to explain the technology made understanding it seem easy. I contend that Hanson Robotics similarly takes advantage of cultural concepts of femininity and womanhood. Appearing as a woman makes Sophia seem less intimidating and less prone to violence. Instead, Sophia claims merely to be a helper that will tidy up some of humanity's mess, and will be a supportive partner as individuals find personal fulfillment. Sophia's simulated gender thoughtfully mimics the normative gender dynamic of men and women, wherein the latter's domestic labour allows the former to create a meaningful life. Motivated by user-acceptability, Hanson Robotics makes use of the patriarchal gender norms and identities that continue to exist.

Staying Critical

Sophia's apparent gender and racialization are carefully constructed to avoid inciting fear and to make complex technology accessible to the public. Goertzel admits:

> If I tell people I'm using probabilistic logic to do reasoning on how best to prune the backward chaining inference trees that arise in our logic engine, they have no idea what I'm talking about. But if I show them a beautiful smiling robot face, then they get the feeling that AGI may indeed be nearby and viable (2018)

Sophia's friendliness and familiar shape eases people into the idea of having robots integrated into their daily life. This helps with user-acceptability, but also allows Hanson Robotics to further advance their AI systems. This latter consequence is easy to forget as the innovative technology and exciting strangeness of the humanoid robot distracts from the fact that Sophia's sensors collect data in order to progress its AI systems.

Each time Sophia takes the stage to promise the public good, the private company's possibility for massive profit is increased through publicity and, more importantly, collection of data to train AI software further. Further, Hanson Robotics takes up a linear and uncomplicated version of temporality, which serves to confirm their stance and make creative middle ground difficult to defend. In order to slow down Hanson Robotics' proposed time I take an intersectional approach, drawing on Science and Technology Studies to examine Sophia as a manifestation and terrain of contending social and economic values. This process reveals that while Sophia's technology may be cutting-edge, the techniques for its dissemination rely on colonial techniques, as well as historically normative racial and gender identities. Eradicating or even just identifying these values requires more critical research on the communication methods and material design of robots that are being introduced into daily life.

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7. Ethical Aspects of Human-Robot Collaborations in Industrial Settings[43]

Introduction

The future of human–robot collaboration is changing as robots are no longer considered mere tools; rather, robots are now seen as collaborative partners in completing a task. Under the umbrella of Industrie 4.0 (I4.0), a term coined by the German government and widely adopted to describe the future of high-tech manufacturing (e.g. 'smart 'factories and warehouses) (Gilchrist 2016), robots are being developed to be more adaptable, lightweight and flexible (Fletcher & Webb 2017). These new qualities allow robots to "work with people hand in hand on a common task (with a specific goal). They use their mechanical and sensory skills to make decisions with regard to products and processes" (Bendel, 2018, p. 277). The close dynamic between human workers and robots within the setting of I4.0 is a radical shift from workers being required to avoid hazardous robots (Fletcher & Webb, 2017). With the increase in collaborative robots comes the need for 'moral learning' (Van De Poel, 2018) about the ethical impact resulting from these new kinds of human–robot interactions. To date, public debate concerning robots in the workplace have focused on fundamental ethical issues of job loss when robots replace humans, and/or physical safety of robots and humans in close collaboration. The purpose of this chapter is to expand the current ethical discussion on collaborative robots in industrial settings to include new concerns that have only recently come into view.

Despite the considerable change that will occur in workers' relationships with robots, there is only preliminary research into the ethics of collaborative robots in industry. To date, researchers have pointed to potential job loss (Frey & Osborne, 2018), reorganization of labour (McAfee & Brynjolfsson, 2015; Went, Kremer & Knotterus 2015; Autor, 2014), psychological harm (Fletcher & Webb, 2017), informed consent concerning data collection (Fletcher & Webb, 2017; Bendel, 2018; Went, Kremer & Knotterus, 2015) the need for user involvement in technology design

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(Went, Kremer & Knotterus, 2015), hierarchy of decision- making (Bendel, 2018), and coerced acceptance of robots and/or lack of ownership over new work (Bendel, 2018; Went, Kremer & Knotterus, 2015). Each of these issues remain relevant in today's discussion of the ethics of collaborative robots, however, as the technology becomes more pervasive in factories across the globe it is important to take stock of other underexplored ethical issues.

The following chapter begins the process of 'moral learning' about the new ethical issues raised by collaborative robots in industrial contexts by building on the ethical issues listed above. In particular, adding a broader set of ethical considerations going beyond physical harm and informed consent to include a focus on emotions and embodied experiences. This provides more nuance to the previously listed 'psychological harm' to include other considerations such as: how robots impose ways of working on humans and how this affects people's experience of the meaning of work; potential effects of working with one's replacement; 'chilling effects' of performance monitoring; disclosure of new and unintended information through data collection; the inability to challenge computerized decisions; and the potential for bias in algorithmic decision-making. We conclude by arguing that to understand the nuanced and complex ethical issues in future factories and warehouses, attention must expand beyond the one-to-one of human and robot interactions and consider the human–robot system interaction (HRSI) when collaborative robots are placed within the context of the digital-physical systems of the industrial setting (VanWynsberghe & Li 2019).

Ethics of Collaborative Robots in Industrial Settings: Current State of the Art

While the intention of this chapter is to begin the process of unpacking and reflecting on the variety of unintended, and potentially unethical, risks associated with collaborative robots in industrials settings, it should be noted that there are at the same time many positive effects of the technology. The new wave of collaborative industrial robots promises to help alleviate the burdens of dull, dangerous, and dirty work. For example, robots can take on the task of heavy and repetitive lifting, thereby preventing long-term health consequences of such work. Collaborative robots, otherwise called co-bots, are praised for their ability to assist workers in the factory often replacing workers from dangerous tasks. Even others argue that the increase of robotics in industry will make it possible for humans to stop mind numbing repetitive tasks, and

focus on using their creative and interpretive capacities (McAfee & Brynjolfsson, 2015).

It should also be noted that while the intention to remove humans from the tasks labelled as dull, that in itself represents an evaluation of certain forms of work currently being done and that there are individuals currently engaged in said 'dull' tasks that are entirely comfortable with jobs of that sort. Although in the more general context of AI, Filippo Santoni de Sio critically examines how certain jobs are deemed "dull, dirty, and dangerous", in his recently published book *Human Freedom in the Age of AI* (2024). He questions how certain jobs are dismissed and argues that we need a little dull work to make our days bearable. As such, the first label of dull tasks as negative and/or in need of being alleviated, should itself be critically examined.

While preventing immediate harm and long-term physical or mental burnout certainly has a positive effect on quality of work, radically shifting workers relationships with robots will inevitably impact quality of work, and therefore is deserving of sustained ethical attention. The ethical issue that receives the most attention, public and academic, is job loss. In a 2017 study, for example, Frey and Osborne estimated: "[...] 47% of total US employment is in the high risk category, meaning that associated occupations are potentially automatable over some unspecified number of years, perhaps a decade or two" (p. 265). In response to the threat of massive unemployment and its potential societal effects, researchers argue for careful reorganization of labour, where robots take on the above mentioned dull, dirty and dangerous tasks, as well as redeployment, where people trained to take on new tasks that "require relatively more judgement, skills, and training". Multinational consultancy firm, Mckinsey & Company, for example, urges employers to ready their employees with the skills needed to work in the future, to invest in "jobs related to developing and deploying new technologies... workers globally will have to master fresh skills as their current jobs evolve alongside the rise of automation, robotics, AI, and the capable machines thereby enabled" (p. 27). Despite best efforts to shift focus from unemployment to redeployment within industry, the threat and fear of job loss is never fully eradicated and often acts as the negative motivator for taking seriously some of the ethical issues listed below.

Physical safety has long been a main ethical concern for humans and robots collaborating on the factory floor and accordingly a high priority for roboticists. The earliest robots in the factory were kept behind cages to prevent physical interactions with human workers, thereby minimizing harm as much as possible. Today, factory robots are working towards the capability to adapt velocity, movement and routes to

avoid collision with other robots, artefacts or humans in their path, with the time of the highest level of safety possible.

Despite the efforts to maintain physical safety when humans and robots collaborate, studies of industrial applications have shown an insufficient effort to integrate worker's needs and wellbeing into the design and implementation of collaborative robots (Fletcher & Webb, 2017; Bartneck, Kulic & Croft, 2008, p. 163). Fletcher and Webb argue that the potential 'psychological harm' of workers is unduly neglected. They claim that asking an individual to work beside robots may be psychological wearing because he or she may have been trained to perceive the machines as untrustworthy or hazardous, "Simply asking individuals to change their assumptions of danger or accept prescribed levels of risk acceptability may infuse various psychological concerns and anxieties, and we should not assume they are able to adopt new concepts that directly conflict with long-held beliefs" (p. 165). The collaborative robots built for the I4.0 context are explicitly designed for increased physical interaction and/or closeness with humans (Gilchrist, p. 270) and the effects of this proximity may well go beyond mere physical safety.

As stated above, the collaborative human–robot dynamic is made possible by advances in "algorithms, metrology, sensory capacity and actuators" (Fletcher & Webb, p. 162). These technological advances open up new ways for data on an individual to be collected, analyzed and stored (Bendel, p. 282). Fletcher and Webb point out that this will not merely be used to ensure a worker's immediate safety, say to stop the robot from knocking him or her over, but also to record and analyze his or her performance (p. 166). When concerning the data collection resulting from working with a collaborative robot, the existing ethics literature tends to focus on informed consent. Questions arise about how data strategies will be communicated to workers and how 'informed 'is to be measured (Fletcher & Webb, p. 166). For example, to what extent does a worker need to understand the technical aspects of data collection? This falls within a wider ethical discussion on best practices to explain to users how their information is being used and most often draws on the work done in medical settings and the concept of informed consent to structure said involvement (Barocas & Nissenbaum, 2014; Beauchamp & Childress, 2001; Solove, 2012). Lengthy technical explanations, for example, are criticized for oversaturating people with information and discouraging them from reading carefully, thereby compromising their understanding. Gaining consent in a work setting is further complicated by the fact that consent may not be freely given if/when a person's job and livelihood are at

stake, for example, if workers are asked to give consent by their employer and are worried about job loss if they decline consent.

Users 'input in design and implementation is another ethical issue that has been raised in so far as worker's participation is often omitted in the design and implementation process (Fletcher & Webb, 2017, p. 162). In an effort to mitigate potential negative consequences of collaborative robots, some researchers have argued that end-users (the workers) should be involved in the design of the technology they work with (Fletcher & Webb, 2017, p. 163; Went, Kremer & Knotterus, 2015, p. 23). If a robot is meant to complement human workers, then workers themselves have valuable insights into what would help them with their work, or what might simply be burdensome or dangerous. Workers 'involvement in how robots are implemented also contributes to an individual's sense of meaningful control over his or her job, which can increase his or her quality of work (Went, Kremer & Knotterus, 2015, p. 25). The lack of worker involvement in design and/or implementation is itself seen an ethical issue worthy of attention but it also points towards another issue, an asymmetry in power between robot workers and human workers.

It has been suggested that 'as robots 'abilities for autonomous decision-making increases the workers 'autonomy decreases' (Teulieres et al. 2019, p. 27). Smart factories, for example, will need to remain competitive and will rely more and more on computers to make fast decisions that can be implemented quickly. As artificial intelligence (AI) is increasingly used in robots, robots may not just take over the physical labour, but also the cognitive functions as well, meaning "humans could indeed become obsolete as partners and teachers" (Bendel, 2018, p. 287. The consequences of robots being primary decision-makers is not only potential job loss, but a shift in authority: "the robot is no longer a mere tool; instead it uses mankind as a tool" (Bendel, 2018, p. 284).

Finally, the existing literature on the ethics of collaborative robots in industry both explicitly and implicitly suggests that workers may be coerced into accepting new robotic technologies. Some points listed above, namely fear of job loss, potential psychological harm, exclusion from the design process, and lack of technical knowledge, point to a lack of freedom when workers are choosing to work with robots. When discussing the use of exoskeletons, which can be used to support worker's bodies in heavy lifting, Bendel claims that a worker may *have* to put on the machine, due to economic motivations rather than intrinsic desire for human enhancement (Bendel, 2018, p. 284). Again, we acknowledge that requiring workers to adapt their labour and bodies to an incoming technology is not a new phenomenon; however, we suggest

that the technologies of I4.0 have a more dynamic relationship with a worker's body, taking a more active role as a collaborator rather than a mere tool. Concern about a human's sense of autonomy seems also to underlie discussions on the meaning of, and ownership of, work.

As the technology of robotics and AI are advancing at a nearly exponential rate (McAfee & Brynjolfsson, 2015) while at the same time still used in society in a relatively experimental manner (Van De Poel 2013), we suggest that those companies who are deploying collaborative robots should aim at moral learning, i.e. learning about the ethical issues that arise when workers have increased exposure to the technology. Moral learning, requires continually taking stock of the known and unknown ethical issues and is necessary in order to mitigate or prevent the previous ethical concerns related to human–robot collaboration. Our goal for the next section is to flag plausible risks for which more moral learning is required to fully understand their scope and impact.

Identifying Gaps to Address in the Future of Human–Robot Collaboration

In this section we expand the landscape of ethical issues that have already been raised by adding nuance to previously discussed issues as well as introducing new areas altogether for ethical attention. In both instances we arrive at this expanded list of ethical concerns by reflecting on the growing applications of collaborative robots in industrial contexts and the capabilities these robots have, as found in the academic literature. Given that there is little literature available on the topic, our goalis also to bring together reflections from other disciplines that address technologies with similar or overlapping technical capabilities. For example, the use of machine learning (ML) algorithms in banking, finance and/or healthcare, have raised concerns about the kind and disclosure of new information that can be derived about individuals when multiple streams of data are combined.

Furthermore, the existing ethical approaches discuss commonly acknowledged issues such as physical harm, privacy, autonomy and security. However, there are also other dimensions of ethical relevance that deserve attention, and which relate to the embodied nature of human–robot interactions and emotional impacts on people. These kinds of impacts are easily neglected because they are harder to pinpoint and formalize, often considered unquantifiable. They may even be considered to be irrelevant by some, but as we will argue below, they are actually of vital importance

for a discussion of the ethics of human–robot collaboration and deserve immediate attention to safeguard the wellbeing of workers who will collaborate with robots.

Imposing on Work Routines

To begin, we take a closer look at the ethical issue of 'psychological harm', already raised by Fletcher and Webb; however, we suggest going into greater detail and depth about the forms that psychological harm may manifest itself. First, we wish to suggest the possibility that robots may impose a way of working of individuals, one that may feel restrictive and/or machine-like. Examples of this include having to adhere to specific routes, work at exact speeds, or place items with routine accuracy so that the robot's work is not interrupted. Being forced to move in such a precise way in order for the collaborative robot to function correctly may lead to frustration, or a sense that one is easily replaceable (with another person or robot). The latter can result in further feelings of being disengaged or insecure in one's job.

The Need to Focus on Emotions

Emotions are frequently neglected in decision making about technology, even in ethical, sociological and participatory approaches to technology assessment and responsible innovation. However, emotions and embodied experiences can point out important ethical issues that need to be addressed (Roeser, 2017) and in this case can point towards underexplored issues in need of greater attention while collaborative robots are being deployed. We will argue that these aspects are ethically important and need full consideration.

The smart devices used in Amazon warehouses, as an example, result in workers attempting to be efficient in the extreme, wearing adult diapers to maximize efficiency otherwise prevented by bodily functions and the need to go to the washroom. The threat of job loss prohibits many people from challenging productivity expectations, even though meeting these standards may lead to physical or emotional discomfort. One worker describes: "You had to process the items in seconds and then move on. If you didn't meet targets, you were fired" (Yeginsu, 2018). The effects of sustaining this quality of work can be dehumanizing: "After a year working on the floor, I felt like I had become a version of the robots I was working with" (Yeginsu, 2018). As people work hand-in- hand with collaborative robots, human workers may be further forced to move in machine-like ways. We put forward here that the scope of potential effects resulting from humans working alongside robots range from harmless adaptation of the body to a greater sense of dehumanization.

Another aspect of psychological harm, beyond a concern of dehumanization to human workers, may occur when the robot is perceived as a threat to one's job. Collaborating with a robot may negatively affect a person's quality of work because she feels as though she is working beside her replacement. Further, as Tom Sorell outlines, workers may be unknowingly training their robotic replacements as developers upgrade the technical capabilities of robots according to the insights made from the work floor (2022). The threat of job loss has been a popular subject of debate for years, but the integration of robots into dynamic work spaces marks a shift from a theoretical threat to one that is more concrete. Already within factories, warehouses, and stores, workers are starting to feel the need to compete with the productivity levels of the robots. For example, when Walmart introduced a robot, the workers expressed a sense of stress when stocking alongside a robot because they felt the need to become hyper-efficient and even 'robotic' (Harwell, 2019). When the task is repetitive and boring, humans compete in vain with robots because the machines can work tirelessly and without breaks. Still, people try to compete in order to keep their job, which results in horrifying and inhumane working conditions. For example, UK trade union GMB reported: "workers using plastic bottles to urinate in instead of going to the toilet, and pregnant women have been forced to stand for hours on end, with some pregnant women being targeted for dismissal" (Drury, 2019).

Performance Monitoring

In addition to psychological harm with an emphasis on emotional responses by workers, we also wish to include an additional set of ethical concerns related to 'performance monitoring' (Fletcher & Webb, p. 159; Bendel, p. 282). Data collection and analysis of the physical environment is a main goal of I4.0 and collaborative robots will play a role in this. However, if performance monitoring becomes surveillance for the sake of surveillance then freedom of workers is at risk. Places of work have never been spaces that allow unbridled freedom, factories and warehouses even less so. Managers oversee workers and cameras have long-since been installed. However, digital documentation of workers "enables monitoring, prioritization and judgement to occur across widening geographical distances and with little time delay; second, it allows the active sorting, identification, prioritization and tracking of bodies, behaviours and characteristics of subject populations on a continuous, real-time basis" (Graham &Wood, 2003, p. 228). In addition, the data may be kept indefinitely without an official process to have the information deleted. As such, performance monitoring should be considered on a short term basis as well as a long term basis in which ones

performance is stored and used for future evaluations and/or predictions of productivity.

Implicit or explicit surveillance in the workplace may have an additional unintended consequence known as the 'chilling effect'. Traditionally, the 'chilling effect ' is made reference to "when governmental regulation and policy not directed at certain activities deters individuals from carrying out protected activities" (Burrell, 2016, p. 585). In other words, the fear of surveillance may have a negative impact on one's ability to function normally in one's day-to-day life. A worker may experience the chilling effect when working alongside a collaborative robot because he or she does not under- stand or feel in control of the data being collected. Robbins and Henschke call this an 'information deficit', i.e. a lack of knowledge on the part of the worker pertaining to the quantity and/or quality of data that the robot is collecting on the worker (2017). The information deficit, in this situation, exists when the employer has knowledge of, and access to, all the data being collected and the way it is used while the worker does not.

A survey done by the Pew Research Center showed that people experienced this chilling effect even when policies were put in place to protect citizen's rights. Thus, as Robbins and Henschke suggest, it is not only about the existence of policies but also about whether or not citizens, and in this case workers, have the 'assurance and ensurance' that their rights are protected (Burrell, 2016). The potential information deficit of workers links to the above mentioned concerns of Fletcher and Webb, Bendel, and Went et al., which grapple with the ethics of informed consent. In this case, we argue that ethics attention on informed consent should not only focus on what a worker can or should understand, but also on how it affects the choices of how people act and move in work. It can have significant impact on people's experience of belonging and commitment and being valued as agents in a work setting.

Another concern related to performance monitoring and surveillance is that of disclosure of new kinds of information when machine learning (ML) algorithms are used to 'make sense' of the data provided by workers. In other words, with outwardly mundane or meaningless data, a ML algorithm may be able to find (seemingly) meaningful correlations in the form of disclosure of new kinds of information. For example, when determining an individual's credit score a bank may analyse her online social presence. In this case her social media presence is being taken out of its original context and used to generate other information. Collaborative robots will contribute novel data streams that may be used to disclose information about individuals. The kinds of information will be dependent on the level of collaboration: passing items

back and forth on the line; pressing buttons to get robots to do what you need; wearing an exoskelton. The results of such collaborations could be giving employers unexpected and private medical information of their employees. For example, sensors may indicate that a worker had developed a hand tremor. The vast amount of data collected in a factory or warehouse using smart technology may be used in various combinations with online search history or social media presence to reveal information about workers that was not originally intended or consented to.

Asymmetry in Power

Additionally, we add to Bendel's brief discussion on the prioritizing of technology over humans, in order to discuss how workers could feel a sense of competition or voicelessness alongside robots. Information collected by collaborative robots adds to the decentralized decision-making of modern industrial systems. When a manager doles out a task, they may be challenged (though not always without consequences). When given a task by a robot collaborator, however, it is difficult and maybe even dangerous to ask for more information in real-time. Further, explaining why one went against the robot's orders may prove challenging as computerized data is often considered objective and therefore correct. Yet, the very notion of objectivity is philosophically contentious. In the case of I4.0, computer analyses are not neutral or objective, but designed with particular perimeters in place. For example, the computer is designed to gather information on worker's speed and length of breaks, but not emotional wellbeing or relationship with a coworker. Therefore, when making decisions or delegating tasks, the computer will only analyse a part of the human experience of work.

We are not suggesting that robots become a direct replacement for managers, but rather that they add complexity into the work systems that may lead to 'algorithmic domination', that is workers being subjects to forms of powers and control mediated by computational technologies, that they cannot contest, and sometimes not even understand (Santoni de Sio, 2024). Relatedly, the decentralized decision-making obscures the process of determining responsibility and accountability. Assigning blame may soon be left to computer analysis, rather than to the interpretation and evaluation by humans. The first steps towards this have already begun, as an Amazon worker reports: "You're being tracked by a computer the entire time you're there. You don't get reported or written up by managers. You get written up by an algorithm" (Drury, 2019). Another ethical concern here is that algorithms can be rife with human biases. Countless studies today reveal how biases present in historical data

are exacerbated in the resulting algorithm with extreme detrimental consequences for society when used in predictive policing and other public services like child maltreatment assessments by governments (Burrell, 2016; Chouldechova et al, 2018; Corbett-Davies et al. 2017; Haussler, 1988). It would be narrow sighted to assume that industrial settings are impervious to similar algorithmic biases. Humans are biased, of course, but prioritizing computer systems under the guise of neutrality risks overlooking harmful prejudices.

Collaborative Robots and Sociotechnical Systems

The introduction of collaborative robots in industrial settings has focused largely on the ergonomics, safety, psychological safety, and efficiency of human–robot interaction. It is our contention, based on the analysis presented above, that the impact of the robot must be assessed or evaluated based on its influence on the system and not only on individuals, and based on other impacts on individuals than traditionally seen, including impact on their emotions and embodied experiences. It has been argued in other work that robots integrated into a healthcare system should be assessed not only for their impact between robot and patient or robot and surgeon but should be understood as having an impact on the healthcare system as a whole—robots will change the way resources are allocated, how surgeons are trained, or what is considered expertise (Van Wynsberghe & Li, 2019). As such, robots should be understood as being part of a socio-technical system—their introduction impacts more than the human with whom it interacts, rather, the robot impacts the entire system to which it enters.

In the same way that robots introduced into healthcare systems should be assessed and evaluated according to their impact on the healthcare *system* rather than their impact on the individuals interacting with the robot, we suggest that collaborative robots in industry settings should be assessed according to their impact on the system as a whole. From this vantage point it becomes possible to understand concerns such as the chilling effect of the information deficit between workers and employers and how this can influence how a person interacts with a robot. This phenomenon, along with the other concerns raised in this paper, can only be fully understood by also taking the system into account. I4.0 demands this kind of multi-layered ethical thinking because the technology itself works within a system.

Conclusion

Current developments in industrial robots point towards a growing trend towards collaborative robots—robots and humans that collaborate to fulfil a task (or a series of tasks). While there are many positives to such collaborations, understood as an increase in efficiency and a decrease in physical strain on human workers, there are also a number of ethical concerns to take into consideration in the overall evaluation of such robots. This chapter was meant to review the current ethical issues identified to date and to point towards new and underexplored issues deserving of greater attention and deliberate study. In particular, we addressed: how robots impose ways of working on humans and how this affects people's experience of the meaning of work; the potential effects of working with one's replacement; the 'chilling effects 'of performance monitoring; the possibility for disclosure of new and unintended information through data collection; the inability to challenge computerized decisions; and the potential for bias in algorithmic decision-making. Most notably we introduced the idea that the emotional impact robots will have on workers is an area in need of greater attention. As a final thought, we aimed to direct the reader's attention towards the need for evaluating robots as sociotechnical systems which demands recognition of the robots impact on all elements of a factory context (or other institutional setting) as a necessary requirement for grasping both the complexity and the breadth of unintended ethical consequences of a human and robot collaborating. Taken together these thoughts are meant to open the door towards new forms of moral learning necessary for assessing the ethical acceptability of human–robot collaborations on the factory floor.

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8. Ethics of Retail Robots: Mapping the Field[44]

Introduction

As retailers across Europe and the United States are increasingly investing in, developing, and/or using robotics, it may soon become commonplace to shop alongside robots in stores and work alongside them in distribution centers (Xiao & Fan, 2020). Demand for retail robots has increased during the COVID-19 crisis, as retailers have struggled with the disrupted supply chains and heightened requirements for hygienic environments (World Economic Forum, 2020). Some countries now also have a labor shortage for retail work.

Companies using retail robots rely upon the oft-used narrative that a new technology will alleviate the burden of labor and ease the shopping experience for the customer. The companies' visions depict smooth worker-robot cooperation, an efficient supply chain, and satisfied customers. Yet, it seems that the Human-Robot Interaction (HRI) occurring in stores and distribution centers is more complicated than the harmonious visions depicted in press releases.

The integration of robots into these spaces will result in a major increase in HRI for employees, customers and the general public. With their daily presence in the spaces of grocery stores, retail-robots will arguably play a critical role in shaping people's perceptions of robots as co-workers and as agents that share our public space and are therefore deserving of critical attention when thinking both about the future of work and future of HRI in general. In other words, retail robotics represents a sui generis case as it promises to bring robots and humans significantly closer to one another in everyday life. Yet, there is hardly any research into the potential ethical and societal impacts of this paradigmatic shift.

The authors of this paper are members of the ICAI lab "AIRlab" (AI for Retail) that is hosted by TU Delft. Our research focuses on the ethical implications of robotization in the retail industry, ranging from production to logistics and

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44 Co-authored with Giulio Mecacci (first author) and Filippo Santoni de Sio (third author) in 2023, ready to be submitted in 2024. Having been on the project for a few years already, I helped outline the types of robots as well as some preliminary ethical concerns. Giulio is responsible for much of framing and writing of the sections on values, though we have written in iterative process. Filippo has aided in the initial set-up and the paper's framing.

distribution. We anecdotally realised that stakeholders involved in the retail sector had a very specific set of concerns, and that a specific set of ethical questions, relevant to this specific field, could be usefully isolated. After some initial research and literature review, we confronted a fundamental question of whether and to what extent it was worth treating the ethics of retail robotics as a domain of its own rather than simply considering one case scenario within the more general debate in retail ethics, ethics of robotics or even the more general AI ethics. Indeed, to gauge the ethical and societal impacts of retail robots we can garner much from the already existing fields of ethical study. However, we argue that there are specific concerns affecting actors and stakeholders in the retail automation industry that deserved to be collected under the same umbrella, if only to aid current and future professionals in the field to promptly carve out a set of ethical questions that apply to them. The present paper is to be considered our contribution in that direction.

This could be useful in at least two ways. First, it should provide robot and AI-ethicists with a common vocabulary and a conceptual framework to organize the debate around this field. Second, it may help engineers as well as entrepreneurs to be aware of the possible ethical implications when designing and deploying retail robots. Similar attempts to map an emerging field have been successfully done in the past. A good example is Mittelstadt et al. (Mittelstadt et al., 2016), who provided important conceptual scaffolding to future investigations on the ethics of algorithms. We will follow a similar rationale, and provide a prescriptive framework structured as to maximize usability by a wide multidisciplinary audience.

An effective and accessible way of carving a taxonomy is to use "values" as fundamental joints. In the last decades much research has been dedicated to the ways human values guide how a technology is designed, implemented and perceived (van den Hoven et al. 2015 p. 1). A value is broadly understood as "what is important to people in their lives" (Friedman & Hendry, 2020 p. 23), which depends "substantively on the interests and desires of human beings within the cultural milieu" (Friedman et al. 2009, p.2). From literature review and an interdisciplinary workshop (explained below), we discerned the following values to be most relevant for the beginnings of ethics of retail robotics: job security, environmental sustainability, psychological and physical wellbeing, privacy and autonomy.

Each section in the remainder of this paper will cover one "value" or family thereof, exploring it where possible from the perspective of different stakeholders (e.g. consumers, retailing companies, engineers etc).

What are Retail Robots?

We use the term 'retail robot' to refer to an embodied and computer operated machine used for (partially) automated tasks along the retail supply chain. There are many variations of these robots and we use this section to provide a sense of the robots currently in use and in development. There are three main contexts wherein these systems are used, namely: stores, warehouses or distribution centres, and delivery. Each of these contexts requires different functions and involves different interactions with humans, therefore inviting unique ethical considerations. The table below intends to provide clarity, although we understand that a fixed and tidy table is not wholly representative of the dynamic effects of retail.

The stakeholders directly affected by retail robotics are employees, customers, and business owners. As retail is a complex global system, however, the effects of retail robotics are felt far beyond three tidy human categories and consideration should be extended to: the environment (eg. land under and around buildings and roads, air space, water usage, mineral extraction sites, waste sites), political and economic systems, and social and physical infrastructure.

Table 1: Types of retail robots and corresponding stakeholders

Context	**Task**	**Stakeholders**
Store	- Cleaning (floors) - Scanning inventory (via QR codes) - Scanning aisles for obstacles - Restocking (bringing items from storage and/or stocking shelves) - Greeting customers	- Customers - Store owners - Employees (front-line, managers, contract) - Competitors (eg. adjacent companies, gig workers)
Warehouse/ Distribution Center	- Heavy lifting (autonomous or collaborative with humans) - Transport - Cleaning (floors) - Scanning inventory (via QR codes) - Restocking (bringing items from storage and/or stocking shelves)	- Customers - Store owners - Employees (front-line, managers, contract) - Competitors (eg. adjacent companies, gig workers)
Delivery	- Semi-autonomous vehicles - Drone delivery - Sidewalk robot delivery	- Customers - Store owners - Employees (front-line, managers, contract) - Competitors (eg. adjacent companies, gig workers) - Other drivers

A retail robot's appearance, capabilities, and interaction with humans will depend on the context and purpose. With the current state of technology, robots are not able to generalize well and are therefore designed to perform specific tasks. A robot that cleans the floors, for example, will typically not also greet customers, stock shelves, and do heavy lifting.

Robots also range from industrial to social, and autonomous to collaborative. Heavy lifting robots in distribution centers, for example, are not designed to have human-like features or sensibilities. On the other end of the spectrum, there are

greeting robots in stores that are explicitly designed for social interaction with humans. Some robots, like a floor cleaning robot, works alone at night, while others, like one transporting in the warehouses, works alongside human workers.

Table 2: Values at stake in retail robotics

	Brief Description of possible concerns
Job security	• Job loss • Job displacement • Deskilling • Reskilling
Environmental sustainability	• Increased energy consumption • Increased usage of non-renewable materials and packaging • Overconsumption/overproduction • Decreased active responsibility of consumers towards goods' sourcing
Psychological and physical well-being	• Increased social alienation of workers and consumers • Increased risk of physical harm due to street and shop level automation
Privacy and autonomy	• Increased collection of personal data and biometrics via sensors • Hawthorne, chilling and other behavioral alterations • Profiling and microtargeting

Job security and labor market

Robotisation may bring about loss of jobs or job displacements in the retail sector. Automation of industrial production processes, specifically those introduced by recent digital technologies, AI and robotics, have been discussed at length in its pros and cons, and its consequences for the labor market have been covered in books and specialized literature. Readers may find in the contemporary classic paper by Frey and Osborne (Frey & Osborne, 2017) an ideal starting point if they want to delve into the vast amount of literature produced in recent years that partially stemmed from that study (Lima et al., 2021). In the 2017 study, the authors predict that "computerisation [will be] principally confined to low-skill and low-wage occupations", which makes it of high relevance in the context of retail industry, where these types of jobs are a significant amount. While this observation is applicable to

manufacturing and industry and logistics across the board, retail's peculiarity lies in the fact that it may see the advent of a new generation of robotics systems in frontline and customer service (Meyer et al., 2020). This means frontline employees may need to undergo a gradual reskilling to develop different competences, and their number may at some point drastically decrease. The current check-out kiosks give a glimpse into that possible future, and Pick&Go has already deployed one of the first completely unmanned shops in Singapore [https://pickngo.com.sg]).

The degree and rate to which this phenomenon will take place depends on several factors, amongst which acceptance of both employees and customers (Meyer et al., 2020; Song & Kim, 2022; Xiao & Kumar, 2021), and actual capacities of the automated systems. In fact, certain tasks, despite they might *prima-facie* be classified as low skill, and therefore in principle "highly automatable", require specific cognitive skills, a significant one being the capacity to reason and act upon common-sense knowledge. This becomes particularly relevant in real-world scenarios when computer vision and robotic manipulation are supposed to address a vast array of unpredictable and complex interactions with the environment, especially one populated by other intelligent agents, such as humans and animals.

Navigating and performing complex manipulations in a physical shop still represents a significant open challenge because the environment is unpredictable. When there are humans about, there is inevitable mess and spontaneity that robots find hard to adapt to. A robot may, for example, be able to scan inventory when items are in the correct location. However, people often place items randomly throughout the store. People also move spontaneously, which is hard for a robot to adapt quickly and in small spaces. It is possible some of these challenges could be addressed in the near future due to the recent introduction and popularization of novel approaches to AI that could enable more sophisticated high-level planning, such as foundation models (Jones, 2023). Large language models (Browning & LeCun, 2023), part of this broader family, have been recently increasingly shown to be applicable to a wide array of multimodal inputs and be suitable to govern robotics systems' actions (Driess & Florence, 2023). We might have to wait and see how and to what extent those theoretical advances can be translated into practical problem-solving capacities that are relevant to embodied systems like those operating in retail robotics. In the meantime, humans will remain in stores.

Environmental sustainability

Environmental sustainability in retail follows similar lines to the more general discussion on industry robotization, with some important peculiarities to take into account. Robots help optimize the supply chain by contributing to more accurate inventory, which can help suppliers adjust to purchasing patterns and ultimately decrease waste. There is also less inventory lost to human error. Streamlining retail work through the use of robotics, therefore, might be said to contribute to sustainability efforts of retail companies.

On the other hand, increasing the number of intelligent machines operating in production and delivery brings about an increase in the demand for both energy and non-renewable materials. Efforts to transition to renewable energy, as shown by e.g. the UN's Sustainable Development Goals Report (see Goal 7), are still insufficient to meet UN's sustainability targets, especially in least developed countries. It is not clear whether and to what extent the production efficiency that robotization could grant the retail industry (e.g. by making possible to keep working at night, in low lighting condition, or by simply eliminating the need for employees to physically travel) would be enough to compensate the energy costs of producing, maintaining, powering and cooling down the machines [(Edouard et al., 2022)]. It is good to keep in mind that some advanced AI techniques, despite the absence of moving hardware or embodied components (e.g. large language models) are well known to require a disproportionate amount of energy and cooling water to work (George et al., 2023; Mytton, 2021; van Wynsberghe, 2021). On the bright side, there are significant efforts in the robotics community to minimize energy consumption and the environmental impact of materials by investing in biologically inspired electronics (Hartmann et al., 2021).

Some environmentally relevant consequences may be directly related to retail robotization. Certain methodologies for robotic manipulation may make necessary for packaging to be arranged and tagged appropriately, and that certain suitable materials are used (Garcia Ricardez et al., 2020). Where this does not per se equal to an increase in packaging material, it is likely to result in the need to wrap or box certain goods with odd shapes and unsuitable textures, like fresh produce, that in traditional grocery shops would normally be shelved unwrapped in crates. Advances in soft robotics are currently bringing interesting results in addressing manipulation challenges for fresh produce (Mulholland et al., 2024), but more time is needed to see to what extent those solutions will be cost effective and widely implementable in practice.

To the extent robotics could further facilitate buying behavior, e.g. by improving accessibility and dispatching times (Cohen, 2018), there is a couple of possible implications to consider. First, increasing effortlessness and a carefree attitude towards purchasing products may lead to overconsumption, on the consumer side, and overproduction, on the producer side. Despite not directly related to embodied automation and robotics, it is meaningful to look at the recent popularization of online shopping platforms that, thanks to extremely low production and logistics costs, can engage in aggressive discounting policies (and borderline deceptive ones, see e.g. the now omnipresent non-skippable fortune wheel in Chinese retail apps bootup), thereby promoting increased consumeristic behavior. Temu, Shein, Aliexpress are cases in point.

Second, the progressive shift towards online shopping, something that robotization is meant to facilitate by e.g. improving logistics, may lead to a progressive detachment between consumers and the sourcing and nature of what is consumed. This may negatively affect their active responsibility towards conscious consumption. In fact, consumers may gradually relinquish the opportunity offered by brick-and-mortar stores to feel responsible and personally inquire about a certain product's qualities, and to see and compare with their own eyes different products in the shelves (where that applies). Missing out on the physicality of in-store shopping is one further step of disconnection with how we get our food and goods. While the effects of this may not easily measurable, we contend that the lack of physicality may well have an impact on people's sense of responsibility. In this sense, consumer protection law will need to take stock and adapt to the changing technological and societal landscape to keep transparency and accountability of retail companies in check. Even where physical stores will remain a desirable option, the (Rancati & Maggioni, 2023) increasing presence of robotic assistants, both embodied or virtual, may gradually decrease the chances of customers seeking for a friendly heads up on products' origin and quality.

Psychological and physical well-being

Robotization could affect the quality of life for sector workers and customers alike. The experience of social alienation in employees participating in partially automated workflows has been for long time well known and studied (see e.g. (Faunce et al., 1962) and other studies from the 1960s), so we do not see anything qualitatively new with the progressive robotization of the retail sector. It remains a significant concern that the progress in humanizing automated workplaces seems to be still lacking behind, with reports of cutting-edge logistics facilities (e.g. Amazon"s highly automated

fulfillment centers) being dominated by efficiency ideals and automation-centric policies of Taylorian memory (Taylor, 1911), with employees having to time their toilet breaks on machines' rhythms (Guendelsberger, 2019).

It is in shops that the presence of robotic assistants, both embodied and virtual, may introduce sensible changes in the customers' experience, while potentially generating some ethically relevant concerns. As mentioned in the previous paragraph, losing human contact has important consequences for responsibly knowing and selecting the goods to purchase. It is furthermore important to consider that human emotional contact is considered in itself valuable (Makarius et al., 2020), e.g. to promote mental well-being and reciprocal care, and may therefore sought by a significant amount of customers, sometimes even constituting the reason to shop. There seems to be no consensus on how automation and robotics presence in shops is received by customers. On the one hand, some research seems to point towards customers having negative feelings about robotic assistants. For instance, some of these customers pointed out how Stop & Shop's storefront robot, Marty, is "creepy", wondering if it were even useful at all, with one customer remarking: "It's really not doing much of anything besides getting in the way" (Gallucci, 2019).

On the other hand, research has shown that a robot's usefulness, social capability and appearance, together with the novelty effect its introduction brings about, are positive predictors of consumers' acceptance of retail service robots (Rancati & Maggioni, 2023; Song & Kim, 2022). Other scholars concluded that whether robotics technology is worth using over human employees may be highly dependent on the context, in the sense that it may "erode some of the positive effects of a pleasant encounter [with a human employee] and, at the same time, offset some of the negative effects of an unpleasant encounter" (Giebelhausen et al., 2014). All in all, determining right scenarios and better practices for deploying robotic assistants is not trivial (Xiao & Kumar, 2021), but if such introduction is ultimately deemed to be desirable or unavoidable, co-presence of robots and human assistants may constitute the best compromise, and a way to facilitate acceptance in transitioning towards highly automatized shopping environment (van Doorn et al., 2016).

More in general, it is interesting to consider how the progressive adoption of robotics in the field of retail, and in particular in the shops, may partially contribute to gradually diminish the feeling of anxiety that characterizes human-robot interaction, especially in laypeople (Makarius et al., 2020; Song & Kim, 2022). As research indicated, repeatedly exposing individuals to a certain robotic agent may significantly contribute to reduce the feelings of uncanniness generated by

appearance, motion, and intelligent behaviour in general (Złotowski et al., 2015). At a societal level, the introduction of robotic agents in retail points may increase by orders of magnitude the sheer amount of exposure that a layperson would normally get. This may influence not only societal acceptance and attitude towards embodied agents, but to technology in general. Whereas this, per se, is neither positive nor negative, it is something to consider carefully when evaluating the wider societal impact of retail robotics, e.g. in the context of technology governance or policy making.

Despite a steady–and encouraging–growth in research activity on safety and ergonomics in industrial collaborative robotics (Gualtieri et al., 2021), robotization in retail, and specifically in shops and public places, could bring about some risks of physical harm that require to be considered for that specific context. In fact, safety measures are mainly designed and developed with both trained personnel and specifically designed infrastructures in mind. Interaction with laypeople in an open, partially unstructured environment, makes potential safety hazards for customers and employees alike harder to predict and prevent. The expectedly frequent compresence of robots and non-trained individuals in open environments with a high number of variables could significantly heighten the risks. This is further problematic as robotization of the retail sector is giving a significant (perhaps the most significant) push on street-level automated logistics, as entire fleets of fully autonomous drones are progressively crowding urban areas, coordinating their activity with vehicles and vulnerable road users alike, with reports of unaccounted accidents. Allegedly, and as a simple example, a food delivery robot in Helsinki recently crashed into a parked car, damaging it. After being recovered by a passer-by, the robot proceeded to flee the scene. (Yle News, 2024). In southeast China, a shopping mall robot fell off an escalator and knocked down two customers (BNONews, 2020).

Privacy and authenticity

For longer than a century, privacy has been discussed as a fundamental "right to be let alone" (Warren & Brandeis, 1890). On the one hand, privacy is therefore inherently desirable. On the other hand, the infringement of such fundamental right is known to bring about further undesirable consequences on authenticity, i.e. the possibility for individuals to remain "true to themselves" and, ultimately, free to conduce their life the way they want and make their own decisions. The effect of being watched on one's conduct were famously hypothesized famously by Jeremy Bentham in the 18th century with his idea of "panopticon", and they materialised in connection

to the early 20th century western industrialisation process with studies such as the Hawthorne Plant experiments (Roethlisberger & Dickson, 2003). More recently, the role of digitisation and robotisation in creating an effective surveillance system, was increasingly acknowledged (see e.g. Shoshana Zuboff's *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power* (Zuboff, 2019))), and specific concerns about the retail sector emerged, e.g. in relation to the retail giant Wal-Mart (Haiven & Stoneman, 2009). The retail giant, known for its capillary control structure, has for instance used radio frequency identifier tags (RFID) to learn and detect behavioral patterns of buyers and employees alike. Goods that are more prone to be stolen (e.g. due to their higher value) would be used to prompt focused CC camera surveillance activity towards certain customers. Similarly, RFID tags could be used to check on employees efficiency and machine learn all sorts of behavioral patterns.

Robotization of the retail sector may create a significant quantitative difference in the ability to monitor customers, collecting and potentially clouding a vast amount of information. We draw attention towards three concerns in particular, all related to privacy infringement and its consequences.

First, robots deployed in public retail environments may need to process information on customers' behaviour and their environment. In several cases the information that needs to be collected for the proper navigation and functioning of some robots is sensitive and raises both privacy and cybersecurity concerns. Just as a mere example, a very simple vacuum cleaning iRobot Roomba collected intimate pictures of its owner which ended up on Facebook (Guo, 2022). Designing embodied systems that absolve their function without extracting sensitive information is a challenge and a concern, granted it is even possible to do so without relying on passive cybersecurity, i.e. trying to prevent malicious access to data after it has been clouded and or stored. The capacity to successfully navigate, and increasingly to manipulate objects in an environment shared by humans, will require the ability to predict their behaviour. This, in turn, may require recognising and computing bystanders' intentions, which is the object of recent regulations (General Data Protection Regulation of the EU, Article 4(14)) and ensuing proposals (AI Act, Title 2, Chapter 5), the latter of which prohibiting "the use of the 'real-time' remote biometric identification system in publicly accessible spaces", with some notable exceptions for law-enforcement.

Second, and connected to the above data collection risks, robots deployed in public spaces in the context of retail may have a chilling effect on customer's behaviour. A chilling effect is when an individual or group refrains from freely engaging in

(controversial) discussions for fear of infringing upon some moral or legal norm, thereby limiting their freedom of expression (Murray et al., 2023). A similar behavioural effect is called Hawthorne effect, which consists of individuals modifying aspects of their behaviour in response to the feeling of being observed or studied (McCambridge et al., 2014). Cameras, sensors and surveillance systems in general are potential facilitators of this effect. The sheer density and proximity of sensors and cameras, resulting from the compresence of human and machines in relatively confined spaces, may lead to an undesirable increase in these effects that are already promoted to a conventionally accepted extent by CCTV systems that are widespread in shops as theft-preventing measures.

Third, the capacity to collect, in principle, a substantially increased amount of behavioural and emotional data from customers, may be seen as an invite to further profiling and microtargeting aimed at increasing consumption. While this is an activity that has been embraced by internet tech giants, there are both moral objections and regulatory trends that may be worth considering while thinking of robotising retail environments.

Conclusion

In this paper we have outlined the current types of retail robots, as well as the potentially affected stakeholders and societal values. As retail robots change overtime, so too must the ethical thinking. Changes in the data collecting capabilities of a new sensor, for example, will need to be accompanied by privacy considerations. Or furthered abilities to move dynamically and work collaboratively will require attention to worker wellbeing. For now, however, we hope to have created a starting point for further research into the emerging field of retail robotics.

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9. Lessons from the Hospice Ward[45]

Questions curdle[46] in my stomach. The lurching bubbles will not cease.

> *Does my research prop up a dying beast? Why do I pretend that this retail system can continue living? Why do I keep it alive through this practice of "technology ethics"? I know about caring for the dying. Is what I'm doing* careless*?*

In my undergraduate degree I volunteered at a hospice. The hospice ward is a fascinating space in our society because everyone in there has given up on fixing. In Canada, where I was, you only get a room if the doctor thinks you have about fourteen days to live. Ease and comfort are prioritized over heroics and urgency. Still, much happens after the words "there's nothing we can do" are uttered. The immensity of death directs away from solutions-based thinking, leaving a spaciousness that allows for the magic of the mundane and the playfulness of spontaneity.

It was clear at my first volunteer training session that hanging out at the hospice was going to be counter-cultural. First, the facilitators were adamant that tip-toeing around death was not allowed. If someone asked if they were dying, volunteers were to say, "You're in the hospice ward. Should I get a doctor to help explain what's happening?" Or, if the mood was right, to just nod and hold the silence together. However we responded, death was to be addressed head-on.

Sometimes people would be scared or angry. In these moments volunteers were not to utter the words, "It's going to be okay". Again, we would sit alongside the person and that other big, horrible thing in the room. The thing was not going away, but at least the person would not have to bear its presence alone. And maybe, *maybe* with some company they could start to befriend it.

Let us tread carefully here because it is tempting to romanticize death. And the truth is that dying stinks. Literally. Emaciated bodies are shocking to see and touch. And grief does not wait until the heart stops; it pulses heavy with anticipatory loss. Yet, dying is full of life. There is laughing, crying, screaming (rarely), tenderness,

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45 Singe-authored and shared on my substack, *Beauty in the Mire.*

46 The word "curdle" is used often by Báyò Akómoláfé. I cannot tell you exactly what he means by it because his poetic language is not graspable. But, to me, his use of "curdle" evokes rotting possibility, a transformative decay, a clumping disintegration, a generative paradox. Embarrassed that I appear to be copying him, I searched for other language. But "curdle" is the word that wants to be here. Perhaps it is stretching out to Akómoláfé's own work, which like good hospice care, does not turn away from the terrifying.

longing, and curiosity. The more we dare to sit with death instead of pushing it away, the more space life has to emerge. This is paradoxical, I know.

The second unusual thing about the volunteer training session was that it was vague. Very vague. Nervous about our upcoming shift, the other trainees and I asked what a typical day looked like, or how we should talk to family members, or how much time we should spend with each patient, or if we should close the room door. The women running the training kept shrugging, "It depends!". They laughed, then told stories of how they made opposite decisions according to the differing contexts.

We were being asked to practice *agenda-free presence*. This way of being gets rid of transactional exchanges and carefully laid out strategies, opting instead for hanging around and seeing what comes up. And that is exactly what I did on Tuesdays at hospice. I acknowledged death and hung around.

What did I do to "help" people as they died? The only thing worth a story was the wedding I helped organize. Not an eye was dry. Otherwise I opened the window for fresh air on request, despite the -30° Montreal weather. I carefully placed flowers near a bedside. I painted nails. I sought out a favourite soup. I chatted about nothing of consequence. These small interactions could not have been planned beforehand nor replicated, but were deeply meaningful.

Is it not amazing that in the face of something as large and unknown as death, it is the small things that heal? Generally, there's no need for grand gestures. What matters is showing up, sitting down, and noticing if someone wants the window open.

Outside the ward and in my work I have forgotten about my hospice training. I have been bandaging fatal wounds and avoiding death's gaze. I breath through my mouth to avoid the stench of decay. I chat about tomorrow as if it were already here. But my bellied intuition speaks otherwise. This world of grabbing and growth is dying. If I dare to acknowledge this, as I have other deaths, what beautiful and terrifying questions might emerge?

How can this death happen gracefully? What would it look like for this world to die well? Can I stay by, so as to not abandon it, while also not enabling it?

10. Care Ethics and the Future of Work: A Different Voice[47]

Introduction

This paper explores the future of robotized work through an uncommon lens: that of care ethics. In her book, *Moral Boundaries: A Political Argument for an Ethic of Care*, Joan Tronto explains that care ethics is not a "complete alternative" to other moral theories, but rather "a glimpse into a different world, one where the daily caring of people is a valued premise of human existence" (1993 p. xi). From this perspective the activities within robotized workplaces— namely factories, warehouses, and distribution centres— are not seen as mere tasks along a supply chain, but rather as points of connection between people. It is my contention that seeing through this relational lens and prioritizing caring connections in the workplace will have profound impact on workers' wellbeing.

Care ethics has been applied within the realm of technology and robot ethics before, focusing especially on context of healthcare robotics (van Wynsberghe, 2016) and whether or not a robot has the ability to care (Sharkey & Sharkey, 2012; Sharkey, 2014). This paper departs from this literature by following a development in contemporary care research that sees care beyond typical contexts, like healthcare, and as a part of social infrastructure (Care Collective 2020; Tronto 2013). It also aligns with robot-ethicists who reject the position that robots are moral agents with the ability to care (Sharkey and Sharkey, 2012; van Wynsberghe and Robbins, 2017) and focuses instead on the how the machines can be integrated into a caring socio-technicalsystem.[48]

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47 Publication details: Ley, M. (2023). Care Ethics and the Future of Work: A Different Voice. *Philosophy & Technology*, *36*(1), 7.

48 This is a hotly debated topic and engaging in it fully would stray away too from the focus of this paper. If you are interested in the topic of robot agency, personhood and rights, I suggest beginning with these resources: Sharkey, A. (2017). Can robots be responsible moral agents? And why should we care?. *Connection Science*, 29(3), 210-216; Sharkey, A., & Sharkey, N. (2012). Granny and the robots: ethical issues in robot care for the elderly. *Ethics and information technology*, 14, 27-40.; Van Wynsberghe, A., & Robbins, S. (2019). Critiquing the reasons for making artificial moral agents. *Science and engineering ethics*, 25, 719-735; Gunkel, D. J. (2018). *Robot rights*. MIT Press; Coeckelbergh, M. (2010). Robot rights? Towards a social-relational justification of moral consideration. *Ethics and information technology*, 12, 209-221.

Care ethics offers a unique perspective in the future of work debates by looking at how workers' relationality, embodiment and emotions are affected by robots in industrial and retail work settings. This approach sees these contexts through a relational lens, helping to identify, evaluate, and improve relationships critical to ensuring workers' wellbeing. Second, care ethics considers taking care of people's bodies beyond mere safety, examining how working with robots can exacerbate societal or economic pressures. Lastly, care ethics takes emotions as an important source of knowledge in building and supporting care. Additionally, this paper contributes to the care ethics literature by applying the framework to the context of robotized industrial workplaces, which has yet to be done.

The paper is structured as follows: Part One presents four different perspectives on the future of work, emphasizing how workers' experiences should receive more critical attention. Part Two introduces care ethics as a valuable tool for understanding the effects of robots at work and outlines the main features of the moral framework. Finally, Part Three applies the lens of care ethics to the context of industrial and retail workplaces that use robots, suggesting how these machines may affect people's relationships, including embodied and emotional relationships. Despite the paper's tidy structure, however, I remind throughout that taking up an ethic of care in practice is rarely so well-organized. Care activities are often determined in the moment according to the contextual particularities. This can be frustrating in cultures that values generalizable principles and checklists. Nonetheless, I invite the reader to open themselves to the messy tangle of caring. It is often unequal, always on-going, and absolutely pivotal to our wellbeing.

Part One: Robots at Work: Disconnected Narratives

This section provides an overview of the common narratives in future of work discourse by drawing from a range of sources, including technical research, press releases, academic economics and philosophy, and news media. Workers' voices show that technical research, corporate messaging, and academic debates are often disconnected from the stress and hardship of those working with robots. I argue for a different voice in ethics research, one that grapples with the experience of relationships within robotized workplaces.

The Technical Aspects

I use the term 'robot' to refer to an embodied and computer operated machine used for (partially) automated tasks and focus on those used in industrial settings or stages

along the retail supply chain. Much of the activity in these settings is repetitive and predictable, and the physical environments are structured, which lends them to robotization. Robots are already used in factories, distribution centres and stores, ranging from heavy lifting to transporting goods to scanning shelves. The range of robotization varies in each context; for example, some Amazon distribution centres have robots transporting goods across the work floor ("What robots do [and don't do] at Amazon fulfillment centers") and some of Ahold Delhaize's distribution centres are almost entirely automated ("'Distribution centre of the future' for Ahold Delhaize" 2018).

The next wave of robots in industry and retail differ from the ancestors found in factories behind safety cages (Fletcher & Webb, 2017). They are dynamic, lightweight, and adaptable (Gilchrist, 2016). Instead of being designed to avoid contact with workers or to stop immediately when contact is made, these robots are designed to move among human workers, either taking over certain tasks in the division of labour and/or working in side-by-side collaboration (Bendel, 2018). Instead of being designed to avoid contact with workers or to stop immediately when contact is made, robots are now being designed to move among human workers, either taking over certain tasks in the division of labour and/or working in hand-to-hand collaboration (Bendel, 2018). These robots are made possible by technical advances in that allow robots to sense and adapt more efficiently to abrupt or unexpected events in their environment. They also shape a new kind of relationship between human and robots, one that is defined by fluidity, close-proximity, and mutual-attunement.

The Visions of Industry

Companies using robots rely upon the oft-used narrative that a new technology will alleviate the burden of labour and allow more time for fulfilling work. For example, Walmart press releases claim that the shelf-canning robot 'Freddy' helps employees endure "less drudgery and enjoy more satisfying jobs" (Harwell, 2019) and Amazon claims that in their warehouses "humans and robots work harmoniously to get packages to customers on time" ("What robots do [and don't do] at Amazon fulfillment centers"). This message is echoed by international consulting firms, like Deloitte, whose consultants write: "The broader aim is not just to eliminate routine tasks and cut costs, but to create value for customers and meaningful work for people" (2019). These visions depict smooth worker-robot cooperation, an efficient supply chain, and satisfied customers.

The Academic Research

Massive job loss and unemployment has been a main concern in the discourse on robotics and AI (Frey & Osborne, 2013, 2017), prompting debates on political solutions like universal-basic income and philosophical arguments for the value of a work-free life (Danaher 2019). However, recent research has shown that the future of work will likely be more nuanced. Automation, robotics and AI, will possibly not cause total loss of jobs, but rather a reorganization of labour (Autor, 2014; Brynjolfsson & McAfee 2016; Went et al., 2015; Willcocks 2020).

Navigating the reorganization generally leads to a discussion on what work humans should do and what should be left to robots. The latter is often handed the so-called "boring repetitive tasks" so that humans have "more opportunity for the creative and interactive work" (Brynjolfsson & McAfee 2016, p. 166). This allocation of tasks counters the concern that robots will take over jobs, envisioning more cooperative and collaborative dynamic between human and machine. History shows, however, that technology does not necessarily ease the lives of workers and can even add new burdens and more work (Bainbridge, 1983; Cowan, 1983).

While there may be clear benefits of using robots for things like heavy lifting or entering dangerous situations, a critical eye must be kept on how and why tasks get defined as human or robot work, and whether the outcome is really less burdensome for human workers. According to the Moravec paradox in AI and robotics, what humans can do easily is very difficult for robots (eg. picking up a glass) and what humans find difficult is easy for robots (eg. repetitive tasks for many hours or analyzing massive data sets) (Moravec, 1988). Therefore, what gets deemed "human work" may be based on technical limitations of robotics rather than a normative stance on what is good for people to spend their time doing. For now, what robots can do and what some claim they *should* to do tend to be conflated because they are aligned at a technical level. But the descriptive and the normative will have to be untangled as technical capacities advance, and explicit decisions will have to be made about what robots should and should not do.

In this regard, research on meaningful work with robots emerges as an attempt to guide robotized work towards a future that is beneficial to humans. A clear hierarchy is set, where robots take up a supportive role so that workers can pursue less burdensome and more meaningful labour. Smids, Nyholm, and Berker identify five aspects of meaningful work that could be diminished or expanded by robotization: pursuing purpose, social relationships, exercising skills and self-development, self-esteem and recognition, and autonomy (2020, 515). Though sociality and relationality

is highlighted throughout, there is an individualist basis to these categories, as the main focus remains on how on the individual worker can pursue meaningfulness on the job.

There are, however, some recent attempts to bring these aspects of industrial or retail work into discussion on working with robots. Fletcher and Webb (2018) consider the potential for psychological harm in industrial spaces deploying dynamic robots, suggesting that asking employees to work beside robots after years of being told the machines were fatally dangerous could lead to anxiety. Van Wynsberghe, Ley & Roeser expand the concept of psychological-harm to include potential emotional-harm caused by the sense of working alongside one's replacement and/or being surveilled (2021). Van Wynserghe at al.'s paper builds on broader insights from contemporary philosophy of technology that sees technology as value-laden (Friedman & Hendry, 2019; Van de Poel, 2013) and something humans both shape and are shaped by (Idhe, 2002; Verbeek, 2006). In this field others have discussed how oppressive power dynamics can be diminished or exacerbated through the use of robotic technologies (Bryson 2010; Coeckelbergh 2021; Nyholm 2020). None of this research, however, has discussed how caring relationships, which involve the body and emotions, are vital in shaping wellbeing at with work with robots.

The Workers' Voices

A different story emerges in the news as workers and customers talk about their interactions with the same robots. Employees in Amazon distribution centres refer to their work alongside robots as a 'cyborg job' and compare themselves to the machines, saying that as a worker you need to "clamp down on your self-respect and dignity" and "learn how to get harder and more pragmatic... Like a robot" (Guendelsberger, 2019). Reports from these warehouses also tell that some workers wear diapers in effort keep up with their robotic counterparts, often ignoring pressing pain and injuries (Guendelsberger, 2019). After the introduction of the robot in Walmart, employees reported that they adapted their behaviour to become more robotic and machine-like, reporting feeling that the company did not not value their work and that they have "never felt more robotic" (Harwell, 2019).

It would be correct to argue that this is a problem of increased automation in general, insufficient labour laws, and a careless culture that demands fast delivery at the cost of human dignity. That being said, I believe that robots deserve particular attention as they can exacerbate anxieties and pressures on workers when not designed or deployed with care or into a caring infrastructure. It is only a piece of a

larger puzzle, but nonetheless important to understand how wellbeing is supported or diminished when robots are introduced to the workplace.

Part Two: A Different Voice

Discourse on future of work is not (but should be) taking advantage of a development within Western philosophy, namely that of care ethics. Since the 1980s care ethics has had wide-ranging applications, from health care (van Wynsberghe, 2016) to democratic process (Tronto, 2014) to economic policy (Nelson, 2011). Despite the variation, care ethicists commonly challenge the culture's proclivity towards individuality and unconstrained economic growth, arguing for a shift into a politics of interdependence that prioritizes wellbeing over profit (Care Collective 2020; Downing 2022; Tronto, 1994 & 2013). Focus on care (and carelessness) should be turned to the context of robotized workplaces, as cost-efficiency and optimizing supply chains risk taking priority over the wellbeing of those working alongside robots.

Within the field of robot ethics, discussion of care is often relegated to the contexts of home (Sorell and Draper, 2010), elderly care (Sharkey and Sharkey, 2012) and child education (Sharkey, 2016; Tanaka and Kimura, 2009). In terms of technology and robotics, care ethics as an approach has been applied extensively in medical ethics, and recently in robot and AI ethics focused on carebots and service robots (van Wynersberghe, 2014 & 2021), facial recognition algorithms (Asaro, 2020) and engineering education (Russel and Lee, 2019). But it has not yet been applied to the future of work with robots in general, nor to the particular context of industrial or retail sectors. At first glance, distribution centres or factories may seem an unlikely place to make use of care ethics, but I argue that the framework is needed anywhere human wellbeing is at stake. As made clear from reports from the last few years, a robotized workplace is certainly such a place. The objectification and dehumanization of industrial or retail workers is escalated by increasingly formalized and digitized methods of optimization (van Wynsberghe, Ley & Roeser, 2021).

In the following section, I explain the fundamental commitments made by care ethicists and outline contemporary articulations of the framework before developing my own iteration for industrial or retail work with robots.

Origins and Foundational Commitments

Care ethics originated in the 1980s with Carol Gilligan challenging her supervisor, Lawrence Kohlberg. She argued that girls' concern for close relationships and how other's feel when making moral decisions did not indicate immaturity, as Kohlberg

concluded, but revealed a "different voice" from the dominant (male) concern with individualism and autonomy (1982). This voice had been historically overlooked in research on moral development, despite its prevalence in daily life. Following Gilligan's seminal work, *In a Different Voice*, care ethics has been taken up by others as an alternative moral theory positing that relationships of care are the basis upon which life and flourishing arise.

Care can be defined in various ways, but a commonly accepted articulation is the following by Joan Tronto and Bernice Fisher:

> a species activity that includes everything that we do to maintain, continue, and repair our 'world 'so that we can live in it as well as possible. That world includes our bodies, our selves, and our environment, all of which we seek to interweave in a complex, life-sustaining web (1993, p. 103)

Tronto further argues that care must be seen as more than an attitudinal stance towards someone or something, instead as a practice that involves "both thought and action" (1993, p. 108). It is an ethics based on connection, of "taking the other's needs as a starting point for what must be done" (Tronto 1993, p. 105). Virginia Held reminds that discerning these needs "involves attention, empathic response, and a commitment to respond to legitimate needs ''(Noddings, 2010). It is through these kinds of committed relationships that humans not only survive, but also come to enjoy a sense of wellbeing.

While various articulations exist, there are commonly held beliefs that form the foundation of care ethics philosophy (Gilligan, 1982; Hamington, 2004; Held, 2006; Noddings, 1984; Tronto, 1993 & 2013). First, care ethics sees human interdependence as a given part of existence, thereby challenging dominant political and ethical theories that prioritize individualism (Tronto 1993, p. 101). To iterate this point, Held provides a blunt debunking of the Hobbesian state of nature: "The picture represents persons as having sprung from nowhere like mushrooms (which was Hobbes's own metaphor) with no notice of persons having been born of mothers and having received a huge amount of care before attaining whatever measure of independence they have" (Held, 2011). Care ethics reminds that humans cannot even be born on their own, let alone survive after that. Simply put, our need for others is primordial and does not fade over time.

Second, vulnerability or weakness is not something to shy away from, but is a central aspect of human beings that should be recognized in each person (Hamington, 2004; Tronto, 2013). In this sense, care ethicists often explicitly reject neoliberal ideology and policy that emerged in the 1980s and sought to shift responsibility of

social care further from the state to individuals. Often this care work ends up on the shoulders of women and especially women of colour, who were likely already doing a disproportionate amount of it to begin with. Under this prevailing politic "dependence on care has been pathologised, rather than recognized as a part of our human condition" (Chatzidakis et al. 2020, p. 23). The denial of humans' innate need for others within neoliberalism is deeply intertwined with moralization of wealth and poverty, where financial independence is the golden standard and financial dependence is indicative of moral deficiency (Eubanks, 2018). The result is a "callous and uncaring climate for everyone" (Chatzidakis et al., 2020 p. 13). An ethics of care sees each person as innately valuable, despite their income or external successes. The tendency to evaluate people on their income or employment is important to keep an eye on when discussing the future of work, as lower-wage jobs can be seen as disposable or unimportant. Interestingly, the recent COVID-19 crisis has called this ranking of jobs into question as the traditionally undervalued work was shown to be essential. Still, these workers are often underpaid and overworked.

Lastly, care ethics is always entangled with the body and emotions. Care ethicists remind that the good life, towards which ethics aims, relies on the support and nurturing of people's bodies (Hamington, 2004; Held, 1984). The fact that we are born as vulnerable bodies, unable to care for ourselves, signifies our relational ontology: there is no being without one another. Though many strive for independence as they age, bodies always slip into illness, injury or depletion and at some point will require an other's help. At the same time, bodies are what we care with (Hamington 2004). Hands hold, ears listen, eyes observe and mouths discuss. Caring is often directed towards the maintenance and support of bodies, which in turn enables people to take up the embodied practice of care.

From Gilligan's study on girls' moral decision-making onwards, care ethicists have argued that emotions are a driving force in shaping people's lives and relationships (Gilligan, 1984; Pulcini 2016). Shifting from a history of philosophy and ethics that deemed emotions irrational or weak, an ethics of care regards emotions as critical motivators for action. Love may bind parents to their children, anger may spur people into revolt. While Tronto points out that emotional connection is not necessary for caring (eg. a nurse is not emotionally affected by each patient), emotions nonetheless often play a hand in motivating people to care (1993). Further, in order to care well for another it is necessary to understand their needs and this requires understanding how they are feeling. For example, feeding a child and providing them shelter while ignoring their fears and confusions is not enough to care well.

Contemporary variations

Increasingly care ethics literature argues that care should not only be prioritized at the individual and community level, but should also be at the level of government (Chatzidakis et al. 2020; Tronto, 2013) and business (Hamington & Sander-Straudt, 2011). A number of recent policy reports have argued for the central place of care in society and the economy, including Oxfam's *Time to Care* report (Lawson 2020), the Women's Budget Group's *Creating a Caring Economy: A Call to Action* (2019); and the Leap Manifesto's progressive climate action plan (2017). Each of these reports highlight the need to recognize and support the unpaid care work that sustains human life, and call for a reprioritization of values such that human flourishing ranks higher than profit. In this sense, care ethics is at once a narrow focus on the nitty-gritty things that keep human life going *and* a large-scale political critique of the neo-liberal status quo. I will argue below that the two levels should be understood together when considering how workers are affected by the introduction of robots.

A care ethics approach has also been developed within the field of robot-ethics (van Wynsebrghe, 2013). Care-Centred Value Sensitive Design (CCVSD) is an adaptation of Value-Sensitive Design (VSD) that provides normative grounding to guide the evaluation and design of robots according to care ethics. A fundamental tenet of VSD is that technologies are not objects in the world without value, but are manifestations of the value-choices made by the person, team, and company that developed them (Friedman & Hendry, 2019). Building on Tronto's work, CCVSD provides a framework so that the values of attentiveness, responsibility, competency, and responsiveness can guide the evaluation and design of robots (Van Wynsberghe, 2013). While van Wynsberghe's CCVSD makes major strides in translating care ethics into a practical framework for evaluating robot implementation and design, it draws on a specific section of the care ethics literature to create a design methodology. My intention in this paper is to provide a broader theoretical argument for applying care ethics in the discourse on robots at work, and the insights provided here might be useful in application of CCVSD. In the following section I show how the care ethics lens draws attention to the relationships, both embodied and emotional, that are critical for promoting wellbeing at work.

Part Three: Care Ethics and the Future of Work with Robots

The care ethics approach I propose in this paper follows the fundamental commitments mentioned above— namely that humans are interconnected beings, each person is vulnerable and valuable, and our wellbeing depends on one another.

Following contemporary iterations, I see care not only in the direct interactions humans have with one another, but also as the infrastructure societies set up to maintain the basic needs and wellbeing of its people.

Applying a care ethics framework to robots in industrial and/or retail work highlights the importance of relationality, embodiment and emotions in this context. While care ethics does discuss both technology and embodiment it does not come equipped with a deep account of either, so I draw on robot-ethics (Coeckelbergh, 2021; Dobrosovestnova and Hannibal, 2020; Nyholm 2020; van Wynsberghe, 2014), philosophy of technology (Pesch & Roser, 2015), and feminist phenomenology (Young 1980) to further conceptualize the impact of robots in the workplace.

Relationship as the Core (way of seeing)

Research on the future of work generally discusses three main stakeholders: the engineers developing technologies, the companies deploying it, and the workers using it. This may be a useful shorthand, but the reality is a more varied and complex network that makes robotization possible. The range includes, but is not limited to: front-line workers, managers, maintenance workers, engineers, technical and non-technical researchers, manufacturers, project managers, project owners, consultants, business accountants, sales representatives, lawyers, trade unions representatives, lobbyists, media outlets and politicians. It is the interactions between these people that make up the current and future robotization of work.

Van Wynsberghe and Li have argued that studies in ethics of human-robot interaction (HRI) have too narrow a focus on the dyadic relationship between human and machine, and should step back to see how using robots affects whole systems (2019). They focus on robots used in healthcare settings, but the call for a "paradigm shift" from HRI to Human-Robot-System Interaction (HRSI) is useful in the context of work in general. When a robot is introduced into a work place it not only affects the person in direct contact with it, but also the dynamics between any of the above-mentioned actors, eg. workers and managers, managers and trade unions, or engineers and project managers (McAfee and Brynjolfsson, 2015).

Using the HRSI perspective with a care ethics approach helps to consider relationships beyond the human-robot dyad, but more needs to be done in order to identify the relationships workers have occurring at multiple levels. When a robot is introduced at work, one's immediate, organizational, and societal relationships shift. The first is characterized by temporal and physical immediacy, including the direct and daily interactions people have with one another. The use of a robot at work can

alter these interactions, for example by spreading workers out so that they are not able to chat easily.

Organizational relationships are less direct, referring to how people relate to the organization they work for. A person's sense of belongingness, security, and value in their employment will shape this relationship, as will the institutional make-up of the company. For example, if workers are given a safe space to voice their feelings about working with robots and the company adapts to the mentioned concerns, a relationship of trust may form despite the disruption that can occur in integrating robots.

Lastly, workers' relationships may also shift at a societal level. Increased automation may alter how a person relates to their government, to political parties, or to other social groups within their culture. At this level, relationships are affected by how robots are depicted in the news and media, the way robotization of industry is treated politically (eg. economic strategy or workers' rights policies), or the way different types of work are valued in a society. An example of this would be when a worker anticipates increased robotization at their place of work and they switch political allegiances to support a party that protects their employment.

Distinguishing immediate, organizational, and societal relationships helps to see how robots can cause relational shifts at various levels, but these categories should not be understood in isolation. On the contrary, they often coexist and shape one another. For example, a worker might enjoy the intuitive and competent design of a new robot at work, which makes them feel taken care of by the company they work for and supportive of a political party that supports advancing automation. At the same time, they may have been more accepting of the robot because they already have a positive relationship with the company they work for and generally lean towards technologically-progressive visions of the future.

This section has looked at work through a relational lens, and in the next section I will elaborate on how relationships across the macro, meso, and micro levels can be more or less caring. First, however, I want to note two upshots about taking this relational understanding to work. One, in recognizing the multiple levels of relationships that make up a person's experience of work, there is a move away from the bootstrap-mentality that says an individual is solely responsible for his or her employment successes and well-being. Instead, a person's well-being at work is made up of his or her own character and skills, but also of how they are cared for through the institutional setup and political context. Responsibility for worker well-being is partly lifted from the shoulders of individuals and distributed throughout the network

of people involved in robotics at work. How exactly responsibility is allocated is beyond the scope of this paper, but it is important to highlight that a care ethics perspective makes a foundational shift from individual to collective responsibility for wellbeing.

Mapping Caring Relationships

Identifying relationships is an important step, but only the first. To move from the merely descriptive and into the normative realm, the question arises: what makes a good relationship according to care ethics?

The theory brings reciprocity to the fore, which does not mean equal input or sameness, but rather that each party is encouraged to engage in a way that they are capable of and that is contextually appropriate. Often, caring relationships will have an asymmetrical dynamic. The key is that there is mutual involvement, where decision-making and action are discerned through a process of mutual discernment and attunement. Tronto's work here is helpful, as she breaks down five necessary elements of the caring relationship. First, there needs to be attentiveness, wherein someone suspends their preconceived notions in effort to discern the needs of another (Tronto, 1993, p. 127). Second, there must be a sense of responsibility that pulls one to act upon the previously assessed need(s) (p. 131). Third, there needs to be competence in the act of care-giving, which prevents unhelpful charity and inactive sentiment from being considered care (p. 133). Fourth, there needs to be responsiveness from the care-receiver, which empowers them to participate in how they are cared for (p. 136). Lastly, in her more recent work Tronto adds solidarity to the list, which requires that "caring needs and the ways in which they are met need to be consistent with democratic commitments of justice, equality and freedom for all" (Ibid. p. 23).

After identifying the multi-level relationships that exist in a work context, they may then be assessed according to Tronto's five normative elements of care. To do so in the context of robotics, one might apply an updated version of van Wynsberghe's CCVSD (2013) so that solidarity is included in the analysis. Using Tronto's five features is helpful alongside mapping out relationships because it provides a more systematic way of evaluating these connections.

Care Gaps

Some relationships in the workplace may be clearly caring as they involve attentiveness, responsibility, competence, responsiveness and solidarity. Others may

be less caring, by lacking one or more of these elements. The latter case can be understood as a "care gap", and once identified can be improved upon to foster a more caring connection. Care gaps— those relationships not involving sufficient attentiveness, responsibility, competence, responsiveness and solidarity— are not uncommon nor unique to robotics in the workplace. However, robots being introduced or increased in a workplace can affect care gaps in one of three ways: existing gaps may be exacerbated, existing caring relationships may be weakened, and new relationships may emerge that include a care gap.

In the first case, consider companies that already engage in "care washing," a term the Care Collective uses to describe "corporations trying to increase their legitimacy by presenting themselves as socially responsible 'citizens', while really contributing to inequality and ecological destruction" (2020, 12). Despite using language of care, there may not be sufficient action that meets any or all of Tronto's five elements of care. When robots are introduced or increased in a workplace, there may be (often public) pronouncements that workers will be taken care of, yet without action to understand what this entails and taking up responsibility for it, employees can be left even more vulnerable than before.

The second way robots may affect care gaps is by weakening a previously existing caring relationship. An example of this might be between a manager and front-line workers, who once shared a lot of face-to-face contact. A new robot might distance the two, leaving the manager to learn about workers more through the data collected about work flow, rather than conversation and in-person meetings. While data analysis might bring to light insights to increase efficiency of work, it cannot tell managers how people are feeling or aching or finding meaning in their work. An over-reliance on data can limit a manager's ability to be attentive to the full needs of workers *and* can leave workers with a sense that they cannot voice their needs.

The third way care gaps occur is within new relationships that emerge. An example might be the new connections between those building a robot and those working with it. While engineers may feel a responsibility towards end-users *and* they may have the potential to competently develop the technology so that it meets the needs of workers, if they do not also take the time to learn from the workers as well as incorporate their insights and needs in the technology development, this relationship cannot be considered one of care.

Care ethicists recognize that not all relationships need to be equally close, asymmetries will exist, and some connections will be appropriately indirect (Tronto, 1993). That being said, other relationships, say between the engineers and users, could

mutually-benefit from a more caring connection, i.e. one that involves attentiveness, responsibility, competence, responsiveness and solidarity. Tronto is careful to remind one that moral qualities of care should not be treated as virtues, as this tends towards an individualist conception of moral development where one can cultivate virtues on their own (2013, p. 35). Care ethics, on the other hand, commits to a relational ontology wherein caring qualities emerge only through connection with others. For example, a robotics engineer cannot take up responsibility for workers in the silo of the lab. Responsibility is instead something that develops through cycles of asking, listening and acting that make up a relationship of care.

Embodiment at Work

As claimed in Part Two, taking care of people's bodies is an essential part of caring for people's wellbeing. In the context of work, I argue that caring for bodies should occur at two levels: one, workers' basic bodily needs must be met and, two, the role HRI in shaping one's sense of self should be considered.

When applying care ethics to a robotized distribution centre or factory, one of the first concerns is whether or not the basic bodily needs of eating, drinking, resting, urinating and defecating have been met. If not, there can be little progress on more abstract concepts common to future of work discussions, like meaningfulness or agency. This may seem so obvious it is not worth discussing, but ethical discourse can mistakenly skip over people's most base requirements. While the capability approach takes basic needs seriously (Robeyns, 2017; Nussbaum 2013), even in regards to technology design (Oosterlaken 2012; Van den Hoven 2012), it says little about the caring relationships that enable people to take up the resources they need. The two theories are not mutually-exclusive and are even compatible (Tronto 2013), but for the purposes of this paper let us delve further into the ways embodied relationality of HRI might affect a worker's wellbeing.

Directly focusing on people's bodies is crucial when discussing robotics at work because new technical capabilities open new possibilities for embodied interactions between workers and robots. A robot may affect a person's embodiment directly through its physicality, and indirectly through its cultural and political meaning. In the first instance, a robot's integration on the work floor requires some changes to the environment and to the workflow of employees. This might bring immediate relief and also prevent long-term injuries, thereby contributing to wellbeing. But, working alongside a robot is not necessarily without physical challenges of its own. People are asked to work at specific speed, twist and grab at a certain height, or to stay out of a

robots' way. These changes may lead to new injuries or physical burdens (Harwell, 2019).

In addition the extra physical toll potentially caused by immediate interaction between human and robots, one's embodiment at work can be shaped by personal, social, and/or cultural pressures. As discussed Part Three, the use of robots is supported by a complex network of people. Coeckelbergh argues that this means all robots are embedded in social and cultural practices and therefore take on a socio-relational meaning, i.e. both humans and robots co-shape each other's meaning, both culturally and socially (2021). To further explore this thought at the bodily level, I draw on the work of feminist phenomenologist, Iris Marion Young, who provides a useful description of how oppression can be internalized and taken up in the body's movements. In *Throwing Like a Girl*, she responds to Erwin Straus' assessment that young girls toss balls a shorter distance than boys because of a biological difference (1980, 27). Using Straus' descriptions, where boys use their whole body to throw while girls just use one arm, Young comes to another conclusion: girls have an "inhibited intentionality," where their sense of "I can" is stunted by a self-imposed "I cannot" (36). This limiting schism is not the result of biology, but is taken on by girls because they live in a society that treats them like objects, does not empower them to take ownership over lives, and is frequently unsafe for them (Young, 1980). Thus, they move in stunted ways that lack wholeness and freedom.[49]

Social roles and norms shape people's embodiment when working with robots, too. Dobrosovestnova and Hannibal (2020) also draw from feminist theory of identity to show how being employed beside service robots can perpetuate the pressure to take up gendered and racialized norms at work. A service robot that is unerringly chipper and helpful can make human employees feel the need to maintain a similar outward show. Dobrosovestnova and Hannibal argue that women are particularly burdened by this performance because they are already expected to be more accommodating than men (2020). This pressure is taken up at the level of the body, through welcoming smiles and empathetic nods of the head. Of course, humans are not always smiling or patient and trying to keep up with a robot's unending performance of friendliness distances a worker from her humanity and leads to self-alienation (Dobrosovestnova & Hannibal, 2020, p. 153).

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[49] Young writes in the 1980s and perhaps more girls are now using their whole bodies when throwing a ball. I hope so, anyways. Still, Young's insights on internalized and embodied oppression are applicable in other contexts.

The pressure to mimic robotic traits can be observed in industrial and retail settings, as well. When placed beside robots, workers report the pressure to work faster and more consistently over long periods of time, which is something that humans do not find easy to do (Harwell, 2019; Fletcher & Webb, 2018). In some troubling reports from Amazon warehouses, workers say they wear diapers so that they do not waste time going to the bathroom (Harwell, 2019). As said in 1.4, this example is illustrative of an organization that values profit over wellbeing, a culture of consumerism that expects next-day delivery, and shows the need for proper labour laws. It can also tell us something of how larger social, political, and economic pressures are taken up in a person's physical form and movement. Like with the girls described by Straus and Young, workers are contorting their bodies (eg. ignoring injuries or the need to urinate) under the weight of job insecurity. Part of this contortion may be a rather direct effort not to lose one's job. But, as Coeckelbergh explains, a single robot can take on larger and abstract social meaning (2021), too. In the case of robots at work, the machines may also represent something like one's own replaceability and pending irrelevance. In response people may try to compete or match robotic levels of consistency at the cost of their humanity, at its most base and bodily level. Certainly, this stands in stark contrast to narratives claiming that robots will help people do more "human activities".

It is also possible that the robots could help workers embody the "I can" that Young describes in the boys' movements. For example, an exoskeleton might enable a worker to lift heavier objects with freedom and ease, allowing them to make full-body movements with confidence. However, if the exoskeleton is not coupled with a caring infrastructure at multiple levels (eg. strong labour policies that ensure adequate working conditions, managers that prioritize workers' wellbeing, and empathetic co-workers) employees might just be expected to lift more items faster during their shift, leaving them depleted. A care ethics analysis takes the complexity of embodied experience into account by recognizing that wellbeing is not an achievement of the mind, but an embodied and relational experience.

Emotions at Work

As with the body, care ethics includes emotions as a source of knowledge when caring for one's wellbeing (Chatzidakis et al., 2020; Gilligan, 1982; Tronto, 1993). Dominant Western thinking has pit emotion against rational thought, long associating it with a lack of control, the body, and femininity, all of which are deemed secondary at best (Tronto 1993). Care ethics deems emotions as important contributors to wellbeing *and*

critical to understanding if a person is cared for. Importantly, care involves a full spectrum of emotions ranging from feelings of tenderness and sympathy to anger, frustration, and distress on behalf of ourselves and those we care for.[50]

The dismissal of emotion extends into the philosophy of technology, as emotions are not often taken seriously in decision-making about new technologies (Roeser, 2018; Roeser & Pesch, 2016) nor when deploying robots in the workplace (Fletcher & Webb, 2018; van Wynsberghe, Ley & Roeser, 2021). Concern for emotional effects of robots is often reserved for care robots, especially ones used by children or vulnerable populations. However, the introduction of robots into a distribution centre or store is not without its emotional impact (Fletcher & Webb, 2018; Guendelsberger, 2019; Harwell, 2019). When seeking to understand the effects of robots in the workplace, a care ethics perspective would take this as essential information, trying to further discern workers' feelings.

Emotions, too, should be understood in terms of their multi-level relationality. A robot can affect person's emotions through the direct and immediate interactions, say by disrupting the workflow and giving rise to frustration. At the organizational level, a person may feel pleased to work for a company that integrated robotics in a helpful way. At the societal level, a person may be fearful of a new robot because robots are often depicted as evil or manipulative in movies and TV shows. Emotional responses to robots also arise in embodied interactions. Someone might feel happy to work with a robot that does the heavy lifting. The emotion of happiness indicates that the robot is being deployed in such a way that meets the needs of the worker, contributing to their wellbeing at work.

Workers' emotions may also be directly affected by forming a relationship with the robot itself. As robots become more adaptive and dynamic, the more likely people are to attribute a mind and intentionality to the machine (Nyholm 2020, 137-138). Materiality can also play a role here, as soft robotics invite people into more tactile connection with robots, leading to stronger emotional attachments to the machines (Arnold & Scheutz, 2017). The emotional relationship workers form towards robots in industry or retail is rarely a key focus in the literature, but is nonetheless a critical aspect of someone's wellbeing at work (Fletcher & Webb, 2018; van Wynsberghe, Ley & Roeser, 2022).

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[50] The poet David Whyte's book *Consolations: The Solace, Nourishment, and Underlying Meaning of Everyday Words* (2014) offers a wonderful reframing of anger in a more positive light. Instead of seeing it as something 'bad' to get rid of, he writes that anger is an indicator that something is amiss and likely, there is a boundary being crossed.

Robots' social, cultural, and political meanings also affect people's emotional responses to robots. If people do not feel secure in their employment, the robot can come to represent personal insecurity. Emotions like anger, fear or jealousy may be the result. Not only do these strong feelings block a person's sense of wellbeing in the moment, but further investigation may reveal that they do not feel secure, recognized, or valued. Taking emotions seriously provides an opportunity to learn what people need to be cared for.

Emotions have another role to play in the creation of caring work environments. The Care Collective reminds that caring is often imbued with complex emotions (2020, p. 28)— feeling burdened by the need to care can lead to resentment, love for another might keep one at a job they hate, and fury at a government's inaction can give a person the courage to fight for change. Emotions drive care and they inhibit it, therefore should be identified and understood when seeking to create caring infrastructures at work.

Conclusion: Towards a Caring Future of Work

I have focused on the present as a transitory moment, where robots have begun to step beyond barriers and work alongside humans, but have not yet taken up any of the more far-off visions of the media, corporations, or some academics. The future of work, then, is still malleable. It is possible to make it more caring, though it would require immense change in relationships at individual, organizational and political levels. Using a care ethics analysis can help towards this end.

First, caring relationships and care gaps should be mapped out. Then if there is a commitment to foster attentiveness, responsibility, competence responsiveness and solidarity in these dynamics, a more caring future of work might emerge. I argue that this approach also brings forward two oft-overlooked aspects of relationship in industrial and retail work: embodiment and emotions. I propose that embodiment should be understood beyond safety, by looking at how people's bodies take up societal and economic pressures when placed beside robots. And lastly, I argue that workers' emotions are essential to understanding how wellbeing at work might be promoted.

Since care has a long history of being seen as feminine, weak and intimate, a care ethics approach might be quickly dismissed from the industrial or retail settings that seem to align with more masculine qualities like strength and productivity. But these traditional dichotomies only serve old prejudices, and blind from the fundamental and unshakeable dependance all humans have on care. Care ethics is not delicate or impractical. Since the 1980s, philosophers taking this approach have argued that

caring without action is merely an intention. Strong intentions can spur positive change, but they are not enough to support human wellbeing on their own. Care ethics involves discerning how people are doing and what they need, then responding to these needs with practical action. Certainly, this direct caring approach would be helpful in shaping a future of work that supports people's wellbeing.

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11. Response to Emotions and Automation in a High-Tech Workplace: A Commentary[51]

It is with much gratitude that I received Umbrello's commentary, *Emotions and Automation in a High-Tech Workplace: A Commentary*, [52] on my previously published paper, *Care Ethics and the Future of Work: a Different Voice*. Umbrello, in his usual thoughtful manner, provides a thorough overview of my argument and we both seem to agree that care ethics, with its attention to relationality, well-being and emotions, is a useful and urgent addition to the growing debate on work and robotics.

The commentary highlights three areas where my work would benefit from further depth and nuance. I will keep my response to these comments brief, as I generally agree with Umbrello. The areas he highlights are worthy of further investigation and I encourage others to take up this challenge to further care ethics application in technology, robotics and work.

First, Umbrello argues I might have provided a more balanced treatment of robotic technology by including the possible benefits of robots more often and drawing on Industry 4.0 and 5.0 literature, which reframes robots as empowering tools rather than separate entities that take over jobs. Indeed, Industry 4.0 and 5.0 offers a more positive view of robotics that shows the potential robots have to help workers. It would be wonderful to see further research into care ethics and Industry 5.0, especially as the latter will trigger significant changes to relationships at work. A critical mind, however, must be kept when engaging with this literature, as the shift from robots-as-threat to robots-as-tool may simply be a rhetorical device, thereby falling into the trap of "care washing" (Chatzidakis, Hakim, Litter & Rottenberg, 2020).

Second, Umbrello notes that while the paper frequently references Care Centered Value Sensitive Design (Van Wynsberghe 2013), there is not a sufficient explanation as to what is lacking in this framework. Indeed, in the writing of the paper I myself continually questioned whether I should simply apply CCVSD. I felt, however, that

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[51] Publication details: Ley, M. (2023). Response to Emotions and Automation in a High-Tech Workplace: a Commentary. Philosophy and Technology 36 (1):1-2.

[52] Response to: Umbrello, S. (2023). Emotions and Automation in a High-Tech Workplace: a Commentary. *Philosophy & Technology*, *36*(1), 12.

adhering to one design theory would too quickly narrow the focus of the research, thereby undermining the purpose of the paper, which was to provide a broad introduction of care ethics to the field of robotics in the workplace. Design research like CCVSD focuses, unsurprisingly, on design and consequently tends not to take up deep political arguments, social critiques, or phenomenological accounts. This is not to say that design theories are insufficient, but rather that they are not the only way to approach care ethics, or technology ethics in general. My hope is that care ethics is taken up in a variety of ways within robot-ethics, not just in the form of CCVSD.

Third, Umbrello quite rightly points out that my argument falls into the is/ought trap by claiming that relationality *is* foundational to being human and therefore it *should* be respected. In truth, I find myself in one of those wonderful moments in philosophy where I am confronted with a possible misstep at the foundation of my thinking. My intuition tells me to proudly commit to my is/ought conflation, but I will need further thinking on this.[53]

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[53] You can see how my thinking developed on the descriptive/normative distinction in chapter twenty-one, "Caring About Food: Attending to Your Swipe-Click-Buy Habit", page 132.

12. Empirical Investigations: Systems Thinking in Robotic Workplaces[54]

In 2021 I joined TU Delft's *Vision Team Robotics*, a university-led initiative in which a group of interdisciplinary researchers aimed at bridging the gap between academic and societal visions of robotics, and more specifically enriching the academic visions by having researchers actively engaging with societal stakeholders. The three themes of the initiative were: human augmentation, robots at work, and intelligent vehicles. Placed on the subgroup on "Robots at Work", I worked alongside TU Delft economist dr. Claudia Werker to design, conduct, and analyse group interviews with a range of people affected by robots in the workplace in the Netherlands.

The interviews never made it into a journal article, but these conversations nonetheless shaped my thinking on how people design and use robots in industry. Two insights from these interviews stood out to me: one, people from a variety of roles (young student to workers to business owners) feel pressured to adopt robots, whether or not there is a clear need for the machines; and two, implementation of robots fails when the whole system of work is not taken into consideration. Below I explain our empirical method, as well as some key findings.

Methodology

Claudia Werker and I set up the interviews using constructive grounded theory, an inductive qualitative research method that gathers knowledge on a subject through an iterative process of data collection and analysis (Charmaz 2014). This method engages with a context humbly at first, allowing for salient details and overarching patterns to emerge instead of seeing through the lens of a pre-conceived theory or framework.

Yet, constructed grounded theory does not pretend that researchers are blank slates. Of course, we each come in with our own backgrounds and *sensitizing concepts* that serve as "points of departure for studying the empirical world while retaining the openness for it" (Charmaz 2014 p. 30). The sensitizing concepts guiding our research were values, human-robot-systems interaction (HRSI), and, especially for Werker, Responsible Research and Innovation (RRI) systems. In the context of robots at work, we wanted to see how values shaped stakeholder's decision-making and relationships.

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54 Written with Claudia Werker (second author), as a part of our research for TU Delft's Vision Team Robotics' *Robots@Work* team. Verbal consent from participants was given at the time of interviews.

With these sensitizing concepts in mind we chose to do semi-structured interviews with seven stakeholders in industry recruited through professional networks, including a trade union-representative, owner's association representative, consultant, politician, student, worker, and manufacturer. While not exhaustive, the stakeholders chosen to represent a range of roles involved in industrial robotics, giving us a view into the scope of issues and interests. Aligned with constructive grounded theory, the interviewer had questions prepared beforehand but allowed for discussion to evolve on its own and often went off-script to pursue emergent themes.

These first interviews were analyzed through the initial coding process, which involves going through transcripts line by line and making short notes on emerging themes, ideas or concepts. Some of these initial codes included: "complexity of the system of work", "gap between research and experience of work with robots", "prioritization of profit" and "concern for worker wellbeing". The initial coding showed how the interviewees saw clashing values, unclear goals, and disconnected ideals on robotics leading to failures when integrating robots in the workplace. Often the interviewees were describing the actions of one another, so we decided to organize a meeting where they could directly interact and question one another.

To facilitate deeper discussion and make sure that everyone had a chance to speak, we first split the stakeholders into two groups based on themes brought up in their individual interviews and proximity of their roles. Before the stakeholder meeting we held semi-structured preparatory meetings of thirty-minutes with each group to see how they interacted and responded to questions on values. During the stakeholder meeting itself, discussion was guided with semi-structured questions and they were encouraged to engage with one another directly. The floor was then opened up for questions specific to the group. The last ten minutes of the meeting was left for open discussion, inviting questions from stakeholders and researchers present.

The stakeholder meeting and individual interviews then underwent more focused coding, where the concepts of systems-thinking, value proximity, and designing for values at multiple levels emerged.

Interviews on Robots at Work in the Netherlands

The questions for the stakeholder meeting were designed to encourage discussion of values, from each stakeholder's perspective as well as what they perceived other's values to be. Since the preparatory meetings showed that using the term "values" was too vague, we shifted the language to "reasoning", "priorities", "goals", and "importance". Examples of planned questions included: "What do you think is the

most important reason for employers to introduce robotization at work?" and "What benefits do workers have when co-working with a robot? What disadvantages?". Curious about how one stakeholder perceived the values of another we asked questions like, "What do you think is your employer's main reason for to move more towards robotics?", and followed up with the other stakeholder by asking, "Do you think that's accurate?" At times when the interviewee would bring up unexpected values, the interviewer would go off-script to explore further. An example was when gendered values were introduced by the machine operator, and the interviewer asked "Does it play a role that you working as a woman in a man's world?"

Analysis and Results

Systems-thinking

The interviews consistently showed the need for systems-thinking when implementing robots at work. Interviewees brought this up when describing situations where a narrow focus, say on the robot's potential for increased efficiency, optimization or profit, resulted in a failed or ineffective integration of a new robot. Sometimes company owners or business managers would be driven by the potential business benefits of the robot and overlook how the robot would affect the work force and workflow as a whole. For example, one of the interviewees explained that a manufacturer created and a company deployed a robot so loud that the workers having to work with the machine could no longer hear each other. This diminished the social aspect of work to such an extent that people ended up leaving their jobs.

A lack of systems thinking can also lead to ineffectual use of robots, where users are not taking full advantage of what robotization can offer. Again, this may result from a narrow focus on the immediate effects of robots have on optimizing workflow without looking at the wider possibilities. For example, one interviewee explained that in the dairy industry farmers often experienced increased milk production, but did not make use of the data being collected by the machines. This interviewee explained that this was a lack of training in business, but another stakeholder pointed out that this may also be because workplace have not undergone sufficient change *before* the introduction of robots. To maximize the benefits of data collected by robots, there must have been previous effort to digitize work or else much of the potential of robotization is lost.

The main takeaway from the interviewees' experiences is that a robot should not simply be placed in a work environment. Instead, success relies on the previous preparation that has readied the context for integrating the robot so that it benefits

various stakeholders. This requires a systems-approach that expands attention beyond the immediate effect a robot may have on making work flow more efficient, and taking into account the experiences of workers, the preparedness of the environment, and the capabilities available to use robots effectively. Without taking this approach, the positive effects of robots are limited and the potential for negative effect on workers is increased.

Value Proximity

In the context of RRI systems research, Werker had previously explored the concept of proximities. The term comes from research on collaborations, and helps to explain why some seem to work well together and others do not. The literature argues that geographical, cognitive, social, personal and organizational proximities, or closeness, effect collaboration (Hansen 2015; Huber 2012).

Our interviews also suggest the need for an added proximity category, namely that of *value proximity*. We use this term to refer to the distance between stakeholders' values, where closeness may increase the possibility for successful collaboration and gaps may do the opposite. During our stakeholder meeting, we found that value proximity between stakeholders tended towards a willingness to discuss, collaborate, and perhaps come to agree on shared values. For example, the trade union representative and the owner's association representative entered the stakeholder meeting with professional interests that may have clashed. Yet, they quickly engaged in a fruitful and thought-provoking conversation when they found they commonly prioritized the value of transparency.

Most notable was how all the stakeholders shared the value of transparency within the workplace, and felt that when this was not prioritized everyone loses. They told different stories to explain the important of transparency, one focusing on workers' experiences and the other on owners', yet the value of transparency linked the two perspectives and opened opportunity for agreement between stakeholders.

Designing for Values at Multiple Levels

Discussing values and discerning shared values are all important steps, but if there was no subsequent action it amounts to little more than conversation. This may even lead to *ethics-washing*, where a person, organization or government claims to be taking social or ethical issues into account (often publicly) but does not follow through with action and accountability measures. To show how research into values can be put into action, we draw on Ibo van de Poel's three-part value hierarchy, where he identifies an

intermediary stage called 'norms' that links values and design requirements (2013, p. 257). The term 'norms' refers to "all kinds of prescriptions for, and restrictions on, action" and includes 'end norms', which may be "a state-of-affairs but also a capability ('being able to play the piano')" (258). Van de Poel uses the example of a chicken coop, where the design value of animal welfare can be broken down into several norms (i.e. ample living space, litter, perches), which may then be translated in specific design requirements (i.e. 1100^2 cm useable area per pen; at least 250^2 cm litter per pen; adequate perches per pen without sharp edges) (p. 258). These examples focus on the immediate design of a technology, like the shape and material, but our interviews showed that solutions offered by stakeholders were often given at the organizational and socio-political level as well.

For example, several stakeholders discussed that while the value of worker wellbeing was a high priority, there was not sufficient understanding of how robotization would affect the workers' experiences. However suggestions for redesigning at the organizational level were offered as ways to prioritize the value. One interviewee introduced the possibility for a "worker ambassador," or someone who could properly explain to owners what workers were experiencing. It was important that this was an appointed worker, and not a manger, because they would have the first-hand experience as well as the trust of their colleagues. Another interviewee discussed how their company implemented happiness measurements with increased automation, thereby making workers' happiness and wellbeing an explicit priority of the organization. These examples show that, in addition to thoughtful technical design, organizational design can facilitate stronger understanding between stakeholders and potentially more effective transition into robotization.

Concluding Remarks: Connecting Back to the Thesis[55]

The interviews add flesh and bones to the themes of connection and disconnection I explore in this thesis. Trouble arises when decision-makers focus too narrowly on one aspect, instead of treating the workplace and people within it as a complex and interconnected network. Although I have tried here to offer a clear analysis, the interviews also gave me a glimpse into the human messiness involved in the future of robots at work. As the stakeholders spoke, I heard clashing expectations, disappointments, pressures, and ambitions. I also felt gestures being made towards

[55] This is final paragraph is single-authored.

harmony and compromise. These happenings, often unspoken, may well slip the grip of documentation (see: next page).

13. All the Things I Cannot Know[56]

In analyzing these interviews and in writing the *Care Ethics and the Future of Work: A Different Voice*,[57] I have tried to make sense of the research findings in a particular way. Following the norms of scientific writing and analytic philosophy of technology, I organized matters of care and relationship into sections and tripartite levels—micro, meso, macro; direct, organizational, political (three is an appealing number, is it not?). I have written about increases and decreases, as though connection was a matter of math. I have written about proximities, as though connection is a measurement. Although I mildly gestured towards the ways levels might mix and seep into one another, my desire for definition won out.

Linear organization is not bad. It is merely a particular way of looking at things, one which gives a sense of predictability and control, of manipulability and understanding. That is fine, but we must also remember that it is a small part of the fullness. So much of human experience within the more-than-human universe resides outside the grasp of category and definition.

Consider the person who walked into work one day and was placed beside a robot so loud that they could not hear the person beside them. "The person" is not a generalizable anyone. They are a particular person (who we now have to imagine) that ate a particular breakfast, travelled a particular route to work, who has a particular amount of money in their bank account and particular vision of their future shaped by a particular generational history. This person has particular chums at work with a particular relationship to their manager. Concepts can only go so far to provide clarity on how the robot effects this person. The effects are too intricate and unique.

Are you worried that I am saying that everything is so particular that generalization is impossible? I worry about this, too. But then life happens. I chat with a co-worker and we understand each other. A coffee passes seamlessly from the barista's hand to my own. A poem reminds me of something my father said years ago. Amidst all the intricacy, words thread together and concepts gather like currents.

Grasping unto these currents is helpful when the complexity of a system dizzies. Outlining levels and discerning proximities in the context of work help us make sense of things. Perhaps it even helps to bring about positive change. But in the activity of

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56 Written solely for this thesis.

57 Full paper in chapter ten.

conceptual organization, we must not lose sight that the definitions and categories are abstractions. They are tools to be used only temporarily. Care, certainly, is not abstract. It is our active response to the needs of those we are entangled with. As my milk-stained shirt and endless laundry pile of a parent reveal, this is messier than any cleverly constructed taxonomy.

14. One Confession and One Practice[58]

Now seems like a good time to confess something rather important.

I am wary of adding more writing to the care ethics literature. I am especially cautious of providing frameworks and to-dos. Once those are printed out people may come to rely on them. I do not want people to outsource decision-making to an external system. Nor do I think they need to.

I believe that everyone knows, in their hearts, how to care. The trouble is that we do not turn to our hearts very often for guidance. Nor are we encouraged to by social institutions. In all of academic ethics training, no one has mentioned my heart or taught me how to connect with it.[59]

And you, dear reader, when was the last time you consulted yours?

If it has been a while, do not fret. I have a little practice for you.[60] If anything it will serve as a well-deserved break from reading.

Take both hands to your heart.
If you have breasts, you'll need to wiggle things around a little.
Wait until you feel your heart beating.
Listen.
Say: "Hello, darling heart.
How are you today?"

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58 Written solely for this thesis.

59 I recently learned that my supervisor, Sabine Roeser, asks students to connect with their hearts in her ethics teaching to engineering students at TU Delft. So, too, does my other supervisor, Filippo Santoni de Sio, in his course on Art, Empathy, and Ethics. This shows two things: one, I was paired up with the right supervisors; and two, there is more heart in ethics education than I thought. While heart-centered ethics is not the norm, it is encouraging to know that it is happening.

60 A practice adapted from Grace Paley's essay in the *New Yorker*, "My Father Addresses me on the Facts of Old Age". Paley's father tells her it is important to speak to the heart every day and say, perhaps, "Heart, little heart, beat softly but never forget your job, the blood. You can whisper also, Remember, remember." I came across this essay through the endlessly inspiring website, *The Marginalian*, written and curated by Maria Popova.

15. A Philosophic Interlude: Part One[61]

Spaces and Objects that Press Us

A trip to Parkdale

For the next six pages, we step away from industry, retail, and food systems. I take you, instead, to a place called Parkdale, which sits nestled into the south-west corner of Toronto. We must also travel back to a time when the powers of gentrification had not yet sterilized this once-vibrant pocket of the city. If humans always spill over their boundaries, Parkdale was where society's spillover ended up. Shoved out by the rent-costs in the city center and largely neglected thereafter, Parkdale residents seemed to create a world of their own. I am not romanticizing the place—it could be fatally dangerous and people struggled to get by—but the interactions there felt more authentic because they always went off the normal scripts for social interaction. I heard people burp shamelessly during prayers; regularly saw a boa constrictor around a man's neck; and was treated to profound hospitality from strangers. I loved it there.

For twelve years I visited Parkdale's boarding homes with a charity that attended to what we called, a "poverty of companionship". The homes, like their residents, do not quite fit into any category. They are privately-owned (read: unregulated) houses that offer a room, three meals a day, and medication for a cheap price. Those living in the homes were subject to the unofficial "revolving door policy" of mental health care in Canada, which has people moving between the street, jails, hospitals, and boarding homes since the deinstitutionalization of the asylums in the 1950s. The people who work there, generally women of colour with precarious immigration statuses, are rarely trained to work with people who are psychologically unpredictable or in the throes of drug addiction.

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61 I wrote part of this essay before my PhD began at TU Delft, when studying Merleau-Ponty's work at York University and at the University of Copenhagen. While writing this thesis I expanded on the already-written explication of *leveling* to explore materiality in potential oppressive settings. This is a work-in-progress and I would love to expand on it by diving into into: Verbeek, P. P. (2011). *Moralizing technology: Understanding and designing the morality of things*. University of Chicago press. As well as: Coole, D., & Frost, S. (2010). Introducing the new materialisms. *New materialisms: Ontology, agency, and politics*, 1-43). However, much of the (re)learning about the aliveness of things should happen outside of academic books and journal articles. Already I have learned much from oral stories, especially those told by Indigenous teachers for whom animism is a basic part of life. For example, Tyson Yunkaporta "spinning yarns" on his podcast, *The Other Others* and Báyò Ákómoláfé weaving new and old philosophies on the *For the Wild* podcast.

There is a tendency to think that the evil woven into our bureaucratic social systems is sort-of lifeless and passive. But my mentor, the charity's founder and longtime inner-city chaplain named Rodger, said that people do not fall through the cracks, they get pushed. He knew that the social institutions pulse with a lively hatred. When disenfranchisement and neglect did not satisfy hatred's need for violence, our friends from the homes got kicked to death, their tents would be lit on fire, or they would get a more subtle death blow—like the man who got a spot in a government group home after a decade of anxious waiting, only to be sent back to the bottom of the list for a small mistake on the paper work.

Amidst this careless and cruel social system, Rodger created a charity with a vision profound in its simplicity: show up, bring snacks, and see what happens. There was no agenda and no advice. Sometimes we would sit in silence for an hour, sometimes there would be jovial banter, sometimes we would receive a tragic tale. As guests we did not try to steer the ship, but hoped to attend to whomever was in the room. I called it "radical hanging out".[62]

Before and after each visit, I would sit with Rodger in a coffee shop to reflect on the happenings in the homes and our place in them. I did not realize it at the time, but those years amounted to an intensive spiritual training. Among Rodger's many teachings, he taught me to notice how the material set-up of the boarding homes insidiously oppressed the residents. He drew my attention towards the mundane: a broken clock ticking loudly but never moving. A television blasting in a narrow hallway with no place to sit. An ever-so-slight step in a house claiming to be wheelchair accessible. A pale green interior painted yellow. Not a yellow that soothes, but one that accosts. When I naively asked my mentor, Rodger, how someone could possibly choose such an agitating shade to coat the walls of a home he simply answered: "It was on sale."

After three decades working in Toronto's inner-city, my mentor had adopted the cynicism of so many longtime care workers. He pointed to the interior details and identified them as subtle abuses within a larger system of maltreatment. And now after spending a decade of visiting boarding homes myself, I am starting to wonder: Can a broken clock be cruel? A television belittle? A step mock? A paint attack?

In the following pages I explore this question through stories from the boarding homes and the phenomenological philosophy of Maurice Merleau-Ponty (1945/2010). Although it is not the focus of the essay, I come around to consider what

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[62] I write about radical hanging out in chapter nine, using instead the phrase "agenda-free presence".

these insights might offer in the context of human-robot interaction. Material things, like broken clocks, blaring televisions, and repetitive robot co-workers, are a messenger of a wider cultural narrative: certain people do not deserve bodily freedom.

Phenomenal space and leveling

Merleau-Ponty's phenomenological account of "leveling" provides insight into a subject's relationship with the material world (1945/2010), and particularly focuses on times when one is held in resistance-like state, as I saw in the boarding homes. First, it is important to understand Merleau-Ponty's ideas on space and movement. Merleau-Ponty does not consider the motion of the arm as the accumulation of consecutive spatial points, but as a flow unified by the body's intention. The body's movements are not directed strictly by the powers of the mind; when the subject's arm moves towards her glass, for example, she does not consciously direct her limb: "forward, forward, to the right". Motoricity, for Merleau-Ponty, is to be understood "unequivocally as original intentionality. Consciousness is originally not an 'I think' but rather an 'I can'" (p. 139). The subject's spatiality is bodily space, and thus the spatiality of her world is determined by movement of the body. As the arm moves towards the glass with the intention of grasping it, the table becomes the background and the vase becomes "in front" instead of an aimless object among many in the room. However, this is not to say that the world shifts according to the body's intentions. Movement always occurs in relation to the world, determining it while also answering to it. The arm moves parallel to the table, as it cannot move through it. It also moves to the right of the vase, so as to avoid knocking it over.

Space, for Merleau-Ponty, is not laid out before the subject as a series of objective points and measurable distances. Rather, one's spatial situation is unfolded through a play between the body and its surroundings. To explicate this point, Merleau-Ponty cites an experiment wherein a subject views the room he is in through the reflection of a mirror placed on a 45 degree angle (p. 259). At first, the room appears as oblique to the subject, and in effort to compensate he shifts his body and walks on a slant. Yet, within a few minutes, he perceives the room to straighten and his body becomes vertical. Interestingly, this redistribution of up and down is not a result of the subject feeling the walls or calculating angles (p. 259). Rather, as Merleau-Ponty points out, the experiment shows that an almost immediate reorientation of space is an act of the subject's moving body.

Yet, this is not to say that the room shifts according to the body and its sensations (p. 260). The wall is not directed to move to ease the subject's feeling of unbalance—

the world is not answerable solely to the body nor is the body answerable solely to the world. The body does not stand as an isolated standard, or as Merleau-Ponty writes: "As a mass of tactile, labyrinthine, and kinesthetic givens, the body has no more precise an orientation than other contents" (p. 260). The spatial level of the room, at first, conflicts with the one accepted previous to the experiment. The prior level used by the subject enabled him to move in unreflective and balanced motions. When placed in the experiment, his situation is shifted in such a way that the familiar motions become foreign. His past spatial level is no longer appropriate, and there is moment of disorientation before adaptation. The act of reorientation, a sort-of leveling out or straightening, is made possible upon the ground of the subject's "general level of experience" (p. 260). This primary level is the "body as an agent" (p. 260). For Merleau-Ponty, spatiality is neither objective nor subjective, but rather constituted by the body's possibility for interaction with the world. The body takes up its situation according to what it can do. It is this "phenomenal place", the space of the body's possibilities, which shifts the room from oblique to upright (p. 260).

The general level of the body exists prior to any mental reflection or deliberation. When Merleau-Ponty writes "the body is a system of possible actions", he does not suggest that these possibilities are introduced through a creative act of the mind (p. 260). The subject's thought "I think I can climb these stairs" is a secondary and reflective articulation made available only by a relationship the body already has with the world. The very concept of climbing stairs requires one to have a mobile body that can hoist itself upwards. The reflection in the form of "I can do *x*", "I cannot do *x*", or "*x* is difficult" is part of the subject's personal experience, but arises from a primordial foundation void of particularity. This general ground, the "pre-personal tradition", is the body— not given as an absolute at birth nor fixed by the subject's interpretation of it. Rather, it takes up each moment anew offering an anonymous ground from which the particular subject acts and gathers its unique history (p. 265).

When the subject moves through the room with the mirror attached, he feels upright while perceiving himself to be lopsided. In an effort to compensate, he becomes lopsided while perceiving himself to be upright. This results in a momentarily disorientation, as there is a disconnect between his virtual body and his actual body. He cannot inhabit the room because when he attempts to straighten himself, he becomes only more angled, and when he steps left it appears right. There is rupture between his motricity and perception. Motions like walking, which only moments prior had no need for attention, are brought to the forefront of his mind. Ease can only be restored once there is harmony between his actuality and intention (p. 261).

Then, the body fades to the background as "the darkness of the theatre required for the clarity of the performance, the foundation of sleep or the vague reserve of power against which the gesture and its goal stand out" (p. 103). A fitting new spatial level can only be introduced when the subject inhabits his present situation, answering to the body as it moves according to its possibilities. Leveling occurs as we move through any space, but Merleau-Ponty does not acknowledge that some spaces are more difficult to gear into.

There was a home I visited that sat in the middle of a residential tree-lined street. Neighbours regularly fight to shut it down or have certain tenants evicted. Yet, there it sits: a disruption within an otherwise tidy and quiet area. During a recent visit the cold weather forced us inside, requiring us to shimmy down a narrow basement hallway with a subtly flickering florescent light. The dining room where we gather had new chairs and I rushed over to try them out, pretending to be a chair critic: "A comfortable seat supported by a sturdy back." Silliness aside, I silently noticed that my feet were not touching the ground. I continued my investigation by shuffling in and discovering that my knees could not fit under the table. I must have looked confused because the cook came over to say matter-of-factly, "They were barstools so we cut them down." I looked around to see that they were all about the same height, meaning that someone had measured and cut each metal leg. Unsurprisingly, some measurements were uneven, leaving certain chairs doomed to instability. To eat, the only options are to hunch over the table or bravely move the utensil across the lap. Addictions, psychiatric disorders, or general wear-and-tear of living in poverty leave many of the residents with shaky hands. Imagine— a room full of adults all dangling their feet while navigating the turbulent flight from plate to mouth.

Disorientation and homelessness

Some living situations act more forcefully on people than others, constituting a space that challenges the body at a primary level. Generally, a subject moves through daily activities with familiarity, sleepily pouring coffee without spilling and navigating the sidewalk traffic while creating a mental to-do list. This easy movement signifies a sense of being at home in the world, as the body and its surroundings co-exist without conflict. As one becomes familiar with a living space, the body moves through it without the explicit demands of the mind directing: "step, step, turn corner." The body inhabits the space easily and the subject is "at home."

The experience of disorientation or homelessness, in the phenomenological sense, is when the space and the body no longer exist in a harmonious flow of movement.

This occurs when, for example, one moves habitually through the living room and is painfully confronted by a newly positioned coffee table. Suddenly the space and the body, which both existed unnoticed in the background of experience, rush to the forefront demanding attention and reconciliation. In this experience the person is momentarily not at home in the world because she is unable to inhabit or settle into her surroundings.

Sometimes it is easy to level. After a few days of moving about a newly arranged living room, we get used to taking a new path. Sometimes, however, the objects and space are more imposing and harder to adapt to. In these cases, there is a form of oppression described by Iris Marion Young as "powerlessness" (1990, p. 56). This particular type of subjugation is experienced by those who "lack authority or power […] those over whom power is exercised without their exercising it; the powerless are situated so that they take orders and rarely have the right to give them" (1990, 56). Together, powerlessness and homelessness hold a person in a state of embodied tension, constantly reminding her that she occupies a place that is not her own.

Although residents of boarding homes are not literally homeless, I suspect that the space added to a sense of being phenomenologically so. For years Rodger would take on students from the local theology college for training in inner-city chaplaincy. On first days, Rodger always asked the same questions: "What do you like when you're sick? What makes you feel better?" The answers did not vary much. People generally want dim lights, comforting food served in bed, a quiet space, cozy blankets, loving support, hot tea, and privacy. For each of these comforts, the boarding home often offers the opposite: florescent lights blasted on by a roommate, bland pasta served in a dimly lit basement kitchen, noisy chaos of other residents, scratchy sheets, and brisk encounters with a house worker. Residents of the boarding homes are often in need of comfort, but live in places that intensify their vulnerability.

Back to the robots

What does any of this have to do with robots? Well, the machines are not yet good at adapting to the fluid and unpredictable movements of humans. To ensure that the machines successfully complete tasks, they need to avoid spontaneity by either being bolted to the ground and caged in or by having their environment transformed to encourage predictability. A robot would manage rather poorly in a busy outdoor market with children running and chickens hopping about. But they are beginning to do well in warehouses with straight lines, orderly stacks, clear passageways in repeated

patterns. It is the humans, not the robots, that contort themselves to fit into such a space.[63]

Disoriented at first, many workers will level to the robots and robotic environment just like they have to industrial technologies of the past. But this adaptation may only be a temporary relief. I wonder if the repeated motions of a robot co-worker, which never fluctuate or surprise, bear down on the soul slowly over time. Just like the broken clock in the boarding home, robots used solely for optimization along the supply chain are manifestations of and messengers for a wider culture that actively dehumanizes. A person, with her dazzling and inefficient humanity, will always find themselves homeless in a space built solely for optimization.

References

Merleau-Ponty, M. (2010). Phenomenology of Perception (D. Landes, Trans.; 1st ed.). Routledge. https://doi.org/10.4324/9780203720714

Young, Iris Marion (1990). Justice and the Politics of Difference. Princeton University Press.

[63] In her book, *Alone Together: Why We Expect More from Technology and Less from Each Other*, Sherry Turkle comments that technology is often not quite "ready" to be out in the world, but humans eagerly contort themselves to make it work. For example, the companion robot Paro is far from being capable of intimate connection, yet people open their hearts to it. Publication details: Turkle, Sherry. (2011). *Alone together: why we expect more from technology and less from each other*. New York: Basic Books.

16. A Little Mole Mother[64]

My husband tells me over dinner that
moles get stuck in urban places.
"They have no corridors", he says.

He goes back to eating but I stop.
I'm trying to understand
why is he using the word
"*corridor*" not '*hallway.*'

My stomach lurches in realization.
I look to our garden fence,
eyes widening in new and
terrible understanding.

I scan my horizon and see how land has been made into plots.
Divvied up so there's no mistake over what's mine.

Somewhere, there is a little mole mother
trying to get back to her littler mole babies.
I can feel her panic surging as she scurries along
a new barrier, desperate for a break.

How could we forget about her?
Why would we put our separation above her?

Such strange creatures are we.
Imposing our closed-in-ed-ness on all others,
so that we may sit alone in rooms without ceilings.

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64 Written solely for this thesis.

I pick up my fork and begin to eat again,
forever changed.
I've learned something I can't unknow:
we care more about fences than about moles.

17. Slugs[65]

Enormous slugs have swept over the raised beds and devoured our dreams of fresh spring lettuce. I perform a sense of calm around my children because I do not want them to be fearful. But, all my efforts were undone the moment I felt the slimy squish under my barefoot. I screamed with my whole self and my daughter jumped unto my leg. Pitifully, I attempted to backtrack and assure her that everything was fine. But, she is no fool.

The slugs came tangled up in cultural and social complexity. We were ashamed of them! When we finally dared to mention them to our neighbors, we found that they, too, were overrun with slugs. One couple was salting them, so they would dry up. Another was feeding them to the birds. We considered getting a duck but were unclear on the legality of this, so opted for drowning them in bowls beer. Hedgehogs, we are told, ought to manage the slug population. But these helpful predators have been ousted by the highways, roads, fences, and buildings that block their movement.

So, slugs eat our seeds and we lure them to their end. I feel sick about it, but not only because of the death. Living and growing food in an ecosystem requires my participation and sometimes fatal intervention. I know this. My trouble lies in the feeling that we are just attending to one imbalance at a time amidst a full world of imbalance. How can we temper the slug population without tearing down our fences and petitioning for less roadways? As when feeling the squish under my foot, an irrepressible panic overtakes me when I think about how much would need to change for some balance.[66]

What do slugs have to do with retail robots? Nothing, of course. Nothing and also everything.

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65 Written solely for this thesis.

66 Despite being drawn to Báyò Ákómoláfé's articulation of postactivism *"The times are urgent, let us slow down"*, I am still drawn into a flurry of panicked activity now and then.

18. A Philosophic Interlude: Part Two[67]

Our More-Than-Human Collaborators: Field Notes from the Lab and My Many Desks[68]

At first glance, this dissertation is nearly placeless. The research was conducted in the Netherlands with the financial support of a Dutch retail company, and yet except in the empirical research[69] I chose not to focus on a particular area. The insights of my work, I think, can be considered in any Western country that shares a consumerist culture. But like any generalized claim, things expand into dizzying complexity when narrowing to a particular scenario. The shopping habits of Dutch people in urban areas, for example, are different from the rural Canadian ones I grew up with. Instead of getting all the weekly groceries in a single weekend trip, people pick up their supplies throughout the week. Instead of large cars, their food goes into bike baskets. Still, the disconnection I point to throughout the dissertation is furthered by automation and increased use of robotics is retail settings in Western countries in general.

Although the insights speak to a culture across vast geographical distances, the research itself was not conducted from nowhere. Much of it happened at various desks across Delft: one with a beautiful long-view of the old city, one in the lab beside engineers and robots, one by the sidewalk window while the rest of my house was upturned during renovations, and finally, the one tucked into the back of a closet overlooking my husband's garden. Many insights popped up while walking my dog in the nearby parklands that neighbour farm fields. And others emerged at the cutting board, as I prepared food for my growing family. This research is informed by all of these surroundings. South Holland, then, is its place.

I am drawn back to work by Andrew Pickering, an STS scholar, when thinking about the influence of place and material objects in guiding a person's process of discovery. His theory of *the mangle* describes scientists attuning to objects in the laboratory, but philosophers are caught up in the mangle, too (1993).

Pickering writes within an academic tradition moving away from concepts of objective knowledge and engaging with the complexity of scientific discovery. Pickering's approach destabilizes humans positioned at the center of discovery by

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67 Written partly before starting at TU Delft, but developed and completed throughout my PhD.

68 A list of my more-than-human collaborators on page v.

69 Empirical work found in chapter twelve, "Empirical Investigations: Systems Thinking in Robotic Workplaces".

recognizing that scientific advancement is not simply a feat of human intellect. One's body, culture, personal life, and material setting create the living ground from which knowledge can emerge. Within this understanding, scientific practice is shown to be a dynamic, multi-faceted, and never-quite settled interaction of human and non-human elements. And if the relational complexity of science is to be better understood, then non-human materiality must be taken seriously.

Pickering admits that this post-humanist study of science proves to be "murky" (1993, p. 561). Finding language and conceptual frameworks that account for the role of the material in science without appropriating or personifying objects proves difficult and requires loosening up the binaries of human and non-human, animate and inanimate. In dualist thought, non-human matter becomes a limp and static other because it does not seem to exercise the same agency and activity. Yet, Pickering claims to be "breaking the sin of a symmetry" by arguing that it is not necessary to make matter the same as humans for it to be recognized as shaping in human activity (p. 566).[70]

To understand the dynamic between human and non-human materiality, Pickering investigates the busyness of the lab as "the mangle in practice". Imagine, for a moment, the bustling complexity of a laboratory at its varied and multiple levels: the sound of the chairs, the height tables, the fitting of a lab coat, the temperature of the room, and the clicking of a keyboard. When the mundane is noticed, the list could go on and on— the life of the laboratory always involves numerous humans and material engagements. And so, the noble pursuit of knowledge involves the supposedly immaterial material.

The relationship between the subject and the material, for Pickering, is a mutually-constituting connection played out in a dialectic of resistance and accommodation (p. 567). The words "resistance" and "accommodation" both imply mutual activity. The former occurs only when there is an active challenge between oppositional forces— where two do not simply meld into each other, but each manages to preserve itself without being subsumed or tamed by the other. Even in cases of asymmetrical power, where one party is clearly stronger and more active than the other, there is never a

[70] "Breaking the sin of symmetry"—isn't that a beautiful phrase? It reminds me, too, of how care ethicists acknowledge that relationships of care are often asymmetrical. A child, for example, does not give the same care as their teacher. Nor would we expect them to. In a capitalist political-economy, relationality can be rendered into the form of equal transaction. Allowing asymmetry jolts us out of the expectation of a tit-for-tat, opening up to different possibilities of exchange, offering, and receiving.

pure actor or receiver in resistance; the relationship requires continued connections, wherein each party is both resisting and being-resisted. Here, traditional boundaries between dualist categories, like active and passive, are shown to be porous and allow for supposed opposites to exist simultaneously.

For resistance to cease, one or both of the parties involved must make a movement of accommodation. This may happen under the pressure of brute force, where one's inability to maintain a state of resistance leads to submission. Or, as Pickering highlights, a human may examine her situation and adapt her approach for better results. Up against an unrelenting obstacle, the scientist is thrust into a state of uncertainty. Humility is required to recognize the need for accommodation and admit that force, intellect, or will power cannot always shape the surrounding world. Pickering gives the example of physicist Donald A. Glaser's invention of the bubble chamber to track subatomic particles. Glaser's repeated failures were a "sequence of resistances" that forced him to think creatively and consider ways to adapt his approach (p. 569).[71] Glaser had to know when to push on, and when to step back and come up with new methods. The scientist does not act upon the material but negotiates with it.[72]

Activity and passivity are similarly ambiguous in the case of accommodation. The scientist creatively develops a new approach but does so in response to material resistance. Glaser, for example, is answerable to the facts and needs of the particles, and thus does "not call all the shots" (p. 562). Likewise, the material is shaped and manipulated in response to the scientist's engagement. Accommodation, for Pickering, is similar to *tuning* a radio or car engine "with the caveat that the character of the 'signal' is not known in advance in scientific research" (p.564). Once a successful accommodation is found, a momentary settled state may occur, though it does not last for long. Glaser, for example, experienced a brief time of stillness in 1952 when his bubble chamber prototype seemed to track particles in such a way that they could be photographed. Once his work was made public in 1953, his findings were taken up and developed by others and furthered also by himself (p. 570). The respite was quick, and soon Glaser found himself back in the mangle, where even he, a Nobel prize winner, "was not in control of history" (p. 574).

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71 The process of being thrust into creativity is discussed later in chapter twenty-one, "Caring About Food: Attending to Your Swipe-Click-Buy Habit", where I explore the phenomenon of rupture and caring attention.

72 The notion of accommodation is echoed in the description of *leveling* in chapter fifteen, "A Philosophic Interlude: Part One" and *attuning* in chapter twenty, "Haptic Intimacies".

Is this not wonderfully humbling? Even scientists, revered by Western society for their intellectual power, cannot fully master the material world. In the mangle, humans are decentered and discovery cannot accurately be credited to any one person or being. Certainly, Glaser was the driving force behind the innovative bubble chamber, but his curiosity and goals were shaped in response to a material reality. Further, science is practiced by specific bodies in particular spaces. I love the idea that Glaser's height might have helped him see something others missed. Or that maybe he needed to blow his nose and in leaning over for tissues, caught a view at the exact right angle that lead to an "ah-ha!" moment. Yes, yes. This is wild speculation. But, still, it is fun to imagine. No?

This Glaser business got me thinking about my own work and that of my colleagues. In the early days of my doctoral research I would spend a couple days a week in the robotics lab. Though I kept to my philosophical activities of reading, writing, and staring out the window, I liked to watch and listen to my engineering colleagues. I quickly learned that before anyone got to play with the robot there were countless hours designing, creating and testing the robot's movements in a simulated world on (in?) the screen. While sitting in chairs and clicking the mouse, they worked out potential resistances and accommodations they might meet with the robot on the lab floor. Working with the simulation software itself was not without its own share of tensions, of course. There was frustration over the limitations of a certain program or the cost of another. This was balanced by excitement over "cool" new programs or potential links to renowned researchers at other institutions. The material of science is always caught up in matters of funding and networking connections.

Like the software, the robot did not simply do what it was told either. Its embodiment and technical capabilities made non-verbal demands. The robot had a heavy bottom, an arm with only so many degrees of freedom, sensors here instead of there. Instead of creating or buying a new robot, the engineers accommodated to these resistances.

And my material? Well, I suppose that includes books, notebooks, pens, two whiteboards, and personal groceries. Sadly, none of these are reimbursable despite the ample budget for research materials on the project. My lab? For the first few months of work I split my time between the robotics lab and an office in TU Delft's philosophy section. Then COVID-19 arrived and I found myself stuck in rural Canada at my mother-in-law's farm waiting out travel restrictions. In the morning I fed sheep, horses, and goats, then I would set up shop at a pine dining table overlooking the drab hills of Ontario as they shed their winter snow. After two months,

I got back to the Netherlands and sat in my lonely apartment talking to almost no one face-to-face but my husband. As lockdowns continued, my plans to interview workers in Ahold Delhaize slowly slipped away. I bought an enormous drafting table for a desk. The only chair tall enough and within my price range was very uncomfortable. My back hurt.

Some months after that we bought a fixer-upper in Delft and my giant desk moved around the flat to accommodate various renovations. For a long period, I sat right at the front window. Unlike North America, in the Netherlands sidewalks often go right up to building. Unable to hide, I waved at every passer-by. These greetings helped build my relationships with the neighbours, which I am pleased to say have endured long after I started working in the back of the house.

For a period when I was pregnant with my daughter an orange tarp covered an open wall. I was already feeling low and there was something about that hue that sent me over the edge. The little meltdown that ensued helped me understand that care required me to ease the controlling efforts of mind and listen to my body. These realizations quickly seeped into my viewings on academic practice.

Philosophy gets criticized for being too much in the mind, but its effects on my body were clear. I was hunching over. My hips were tight. My eyes squinted at the screen. Eager to prevent the erosion of my posture, I started going for long walks with my dog almost every day. Sometimes I would stop to watch the ducks or marvel at the number of bees buzzing in the summer berries. I would watch the cows in the pastures at the farm where we buy our meat. Over time, I developed a deep familiarity with these places and all the life bustling within them. I never felt badly about taking these walks during working hours because, seemingly without my own effort, some of the strongest writing in this dissertation popped into my head while wandering the fields and parks of Delft. I suspect this is partly to do with my inability to type and, therefore, edit while walking. The lack of digital technology gifted me a particular kind of creative freedom.

My various homes and the surrounding environment have been my labs. The shifting desks, screens, windows, and chairs have been my material. The resistances they posed were my mangle. To accommodate, I sought out deep connection in my local life. Without these experiences, the findings of this research would be something else entirely.

References

Pickering, A. (1993). The Mangle of Practice: Agency and Emergence in the Sociology of Science. *American Journal of Sociology*, *99*(3). https://doi.org/10.1086/230316

Figure 2 Cows of Hoeve Biesland

Figure 3 Writing in the kitchen, waiting for bread to proof

Figure 4 Note taking with sidekick, Edgar Alan Pup

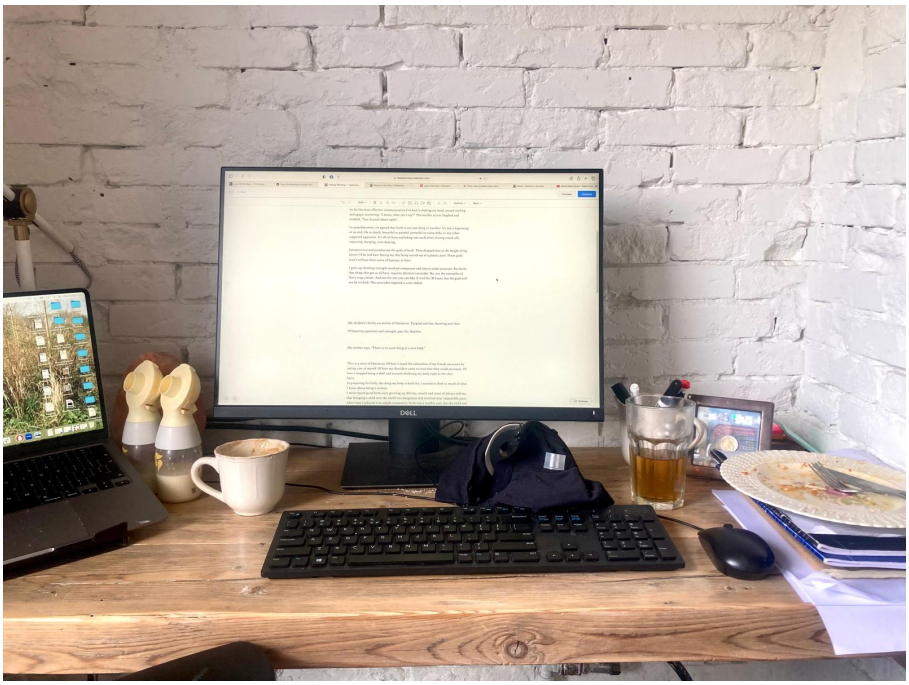

Figure 5 A glimpse into what inspiration looks like in early motherhood

19. My Inefficient Grocery Routine[73]

Last night my family ate pasta topped with a jar of tomato soup. My ever-resourceful husband prepared it as I shrugged in defeat, bouncing our baby on my hip. We both knew there were no alternatives in the cupboards. We have two young children, full-time jobs, and no family around to support us. Despite the many joys of new parenthood, we are often exhausted. Managing to get food on the table without anyone (child or adult) having a meltdown is a weekly challenge.

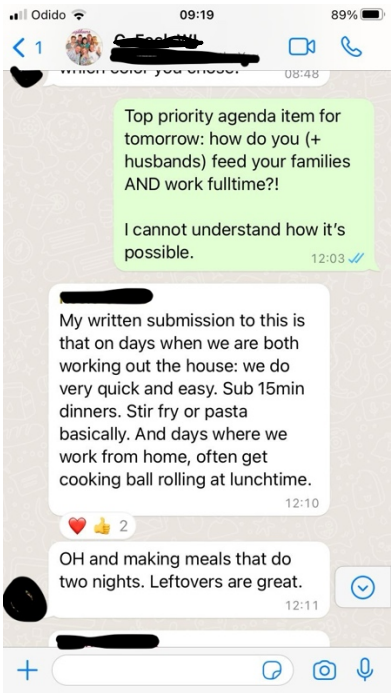

Figure 6 Excerpt from group chat, the day after tomato soup was poured on pasta (19-03-2024)[74]

Food prices in the Netherlands have increased around 12% last year and 10% the year before. Every few months my husband and I tinker with our budget, pulling back in all other areas so that we can keep buying organic, local, and biodynamic food on

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73 Written solely for this thesis.

74 Shared with permission from the members of the group chat.

PhD and gardener salaries. It is not easy. Sometimes I wonder if this deliberate and political choice is reasonable.

I share this with you because when people hear my grocery routine, they tend to think that I meander from shop to shop without financial or temporal stresses. But I, too, feel a sense of impossibility in front of the fridge throughout the workweek. I, too, desire ease in a way that makes automation so appealing.

Still, I resist reaching for the grocery app. Like most technological solutions, it provides a quick sense of relief while also distracting from the bigger questions and trade-offs. I am unwilling to fully hand over my nourishment to the tyranny of efficiency. Perhaps it would be "easier", but this does not outweigh the loss of pleasure and community.

Shopping online or in community-less stores has become so normal that I think people have a hard time imagining what another way would look like. My weekly stops will give you a sense of what is possible:

- Local organic mill: vegetable box, bulk flour and oats, tasty treats
- Local organic co-operative: fruit and vegetables, dried goods, some dairy
- Local biodynamic farm: milk, meat, sometimes vegetables and butter
- Local cheese shop: cheese and cream
- Local sourdough bakery: bread and tasty treats
- Local no-waste market: dried goods (*now closed*)
- Butcher in nearby town: meat for special occasions

By now, many workers in these shops know my children. They have met my parents and mother-in-law. They ask after our dog. We chat about the rising prices of food and, in turn, delight in seasonal offerings. I learn about the supply chain, they learn about philosophy. Together we wonder about viability of owning small businesses. I sing their praises around town (and in my dissertation). All of this spontaneous community would be lost if I instead had food delivered at my doorstep after swiping and tapping my thumb on a smooth screen.

How can we say that food shops are not places of care?

20. Haptic Intimacies[75]

I am surprised by the threads being woven together here. There is the philosophy of touch, relational ontology, grocery technology, the attention economy, and tactile practices of gratitude. The combination of the subjects is new to me, but the threads themselves are not. I have been long nourished by these ideas, starting at my parents' dinner table. It was a place brimming with culinary delights and boisterous conversation. Neither was always pretty.

And touch? This thread is as old as my time here. At the beginning of our worldly lives we are held wholly and completely while working on the great project of being. Before we can hear and long before we can use language, we receive the Universe's whispering: "*you are whole, you are whole, you are whole*". The great divine establishes this embodied memory in our deepest roots so we may seek it out for protection when earthly life tries to fracture us.

Once we are out of the womb, we are still held. The world just holds us differently than a mother's body. Our very embodiment means that we are always in haptic relationship with our environment. We *live* in touch. Strangely, my culture denies our haptic nature. Instead it prioritizes the senses of seeing and hearing by associating them with the intellect, the mind, and men. Taste, smell, and touch are base and of the body. They are dismissed through their association with emotion and women, both of which are to be avoided in serious circles.

But touch is so beautiful in its base fleshiness and emotion. Our very embodiment means that we are connected with the world, a truth we cannot deny though some might try with dreams of a "disembodied" metaverse. Touch—the thing we cannot not do—is both an example and metaphor of our primordial interconnectedness.

Hold your own hand. Try to find the precise boundary between one and the other.
Try to discern which hand is touching and which hand is touched.

You will find that the sense eludes the binaries clever minds try to uphold. Our skin, just like our place in the world, is porous. Touching is never a mere connection

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[75] Presented during an online talk for *Life Itself's* series "Posing Questions" (2023, March 11). YouTube. https://www.youtube.com/watch?v=l6p0dKyFCmA

between two things, one and two, but always is an infusion that darts a sly smile at individualism.

Research shows that humans are remarkably good at communicating nonverbally through touch.[76] What, I wonder, do you and I say to the more-than-human world? We may turn to what we each touch in varying degrees each day. Food. That which nourishes us. We pick and squeeze, peel and chop, lift to our noses and place on our tongues. How often are these moments ones where thanks is communicated? How often is it that food is tossed, shoved, and treated without care?

In the last years so much of this initial relationship building with food has been traded for scrolling and clicking on a smooth screen. Online grocery shopping was sometimes necessary under pandemic restrictions and has become ingrained in many of our weekly habits. Though we have personal relationships with our screens, it is a surface without the particularity of a lemon rind or the skin of a unique tomato. Under the insidious guise of efficiency and the cultural obsession with optimizing every minute of daily life, we have lost so many opportunities to connect with our food.

People selling digital technologies use a long-standing narrative that *x* technology frees up time for meaningful pursuits and more connection. But this kind of mathematical thinking treats time, meaning, and connection as things to be parceled up and organized optimally. Of this, I am sure: we do not gain connection via disconnection. Disconnection begets disconnection. Connection begets connection.

I am experimenting with the latter by opting out of the tools that promise me a smooth life. My weekly shopping is now spread over several small shops and I feel what comes home with me. With my hands, I ask the lemons who would like to join the basket. This attentive and caring kind of touch magically transforms the very metaphysics of my kitchen. With a toddler the hours between 5-7pm require dinner, bath and bedtime. Until recently these two hours were fraught with urgency and felt constricting. Every time I turned around I would bump into something.

Then I started touching with intention, sweetly saying with my hands, "thank you cauliflower" and "much gratitude onion!". Suddenly the hours between 5-7pm became infused with spaciousness. Now there is enough time and more than enough space—even with a little girl asking for peanut butter and a boy banging pots at my feet. My shoulders unclench and there is more ease.

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[76] Field, T. (2014). Touch, Second Edition. In *Touch, Second Edition*.

Sometimes. Other times I am just as tense as before. Most often, my mood sweeps along a great spectrum while preparing one meal. Always, however, I am in touch with the world. This is a connection I cannot shirk.

21. Caring About Food: Attending to Your Swipe Click-Buy Habit[77]

An Introduction

I used to live in Toronto's Little Italy neighbourhood, where I would marvel at the nonnas in the fruit markets. Driven by frugality and insistence on flavour these women picked up each lemon, squeezed it, inspected all angles, brought it to their nose and inhaled deeply. Should the fruit be deemed bland, it was tossed into the pile as the store owner got an earful. Despite the outbursts they would hold up the check-out line to chat with the grocer, empathetically listening to family and neighbourhood updates.

This vibrant social and sensory experience of gathering food is becoming rarer as many of us now get food to the door by a swipe-tap-buy of the thumb, an invisible exchange of money, and a quick delivery. Online shopping was already a part of many people's lives before the COVID-19 pandemic, but the lockdowns and health concerns further integrated it into people's weekly habits. Since online grocery shopping eliminates having to go to a physical store, it is touted as increasing convenience, accessibility, and sustainability.

I believe something more sinister is also occurring, namely *moral deskilling*. The concept was developed by Shannon Vallor within the skilling/deskilling ICT debates, wherein she argues that emerging technologies, like autonomous weapon systems, media multitasking, and carebots, often reduce people's opportunities to cultivate moral skills (2015). Care, she argues, is something that "takes time, and practice, and intelligence, and good will to become even moderately good at it, and even then we may botch the job" (2015, p. 119).

It is my contention that the smooth digital experience of buying groceries through a screen distances us further from the life that *is* our food and the life that grows, harvests, organizes, and distributes our food. This contributes to moral deskilling, as we are less likely to cultivate caring and attentive relationship with this life. Caring attention is essential for care and, I argue, involves epistemological, affective and imaginative elements. Often we have to be disrupted out of our habits to enter into this kind of attention, but the smooth and sensory-diminished user experience of

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77 Single-author and submitted to *Noema Magazine*.

online shopping avoids this kind of shake-up by prioritizing efficiency and optimization.

This paper acknowledges that grocery technology is not a singular problem, but an extension of a larger worldview based on separation, dominance and disconnect. Emerging into a more caring food system would not only require radical changes at the highest political and organizational levels, but also small shifts in the experience people have of gathering their meals. What I am reaching towards, I suppose, is something like the nonnas in the fruit market: to inhale the scent of the lemon with eyes closed, shake a fist at lifelessness, and to demand more connection.

An honest methodology

It is not common to have methodology sections in philosophy papers, but perhaps they should because we all come to our ideas in unique ways. In this case I looked at my own work in the last years and realized I had made a staggering assumption, one that needed immediate attention.

My recent research examined the values embedded in the Sophia robot (Ley, 2021), outlined the ethical aspects of robots in industrial settings (Van Wynsberghe, Ley & Roeser, 2022) and made suggestions to design and implement retail robots in a more caring way (Ley, 2023). While hopefully interesting these papers take, as a starting point, the existence of retail robots as a given. The motivation underneath this is pragmatic and well-meaning. Simply put, I looked at the immensity of the global retail system alongside my culture's expectation of fast delivery and deduced that retail robots will likely become commonplace. My hope with the previous papers was to uncover the human values built into and affected by these machines and suggest feasible changes to ensure a more caring environment for workers in the inevitably of robot co-workers.

I made a philosophical misstep in prioritizing usefulness, one that I believe is not uncommon in the field of technology ethics. By narrowing in on practical suggestions, I missed out on the big foundational questions that should underpin any ethical investigation.[78] Questions like, should this technology exist in the first place? Does it contribute to a world we want— one that is more just, caring and good? To explore these questions freely requires that saying 'no' to the development of a technology be treated as a viable option, no matter how improbable it may seem to implement.

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78 Abebe Birhane's paper "Algorithmic injustice: a relational ethics approach" (2021) also critiques the AI ethics community for focusing too narrowly on fine-tuning models for fairness, instead of stepping back to look at AI within its global historical context.

There is another aspect of my life experience that shapes the thinking in this paper. I grew up in rural Canada where the land endures sustained political tensions between conservationists and industrial farmers. Wild hills roll into fields laid bare to grow potatoes for potato chips. I came to live with this land after my parents fled the nearby smalltown when the Walmart arrived. After years of spent years creating and fiddling alongside the land, my mother eventually co-created a garden so lush that its abundance is a cause for panicked harvesting from mid-summer to fall. For food not found in the garden, there is an on-going tension between my parents about where to shop. My father associated the "health food store" with elitism and wastefulness, while my mother felt it was the only trustworthy place to buy food for her children.

My husband grew up with a mother who says, "food is politics" and we find ourselves uttering the same words at our own dinner table. Most meals, and that is not an exaggeration, we discuss where our food came from, the philosophy behind its production, and how we might shift up our weekly grocery haul to better align with our values. The latest alteration in our constant tinkering, for example, was getting eggs from the milk farm instead of the cooperative so we can bring our own containers. These little changes are on-going because the life that grows our food fluctuates, as life does, and our access to the variety of things we eat is appropriately inconsistent. Seasons change, weather is unruly, and crops fail and flourish. There are only a few weeks each season that I can shop on auto-pilot. But, as I will argue in this paper, it is the constant disruption and reattuning in gathering food that encourages the practice of care when doing the required work of nourishing ourselves.

I shared the personal details above in a department talk recently and a colleague suggested that I have done something like "dinner table methodology". I think he is right. To me, this means two things. First, even though this is a single-author paper many of the ideas shared are the result of countless hours of debating, questioning, learning about food while sitting at my childhood and adult dinner table. They are "my own" in that they are/were formed according to my unique experience and way of thinking. No one else's fingers typed these words. But the ideas are ruminations of ancestral conversations over shared food. Second, dinner table methodology is not only an intellectual activity. It is gathered through my senses—the smell of thyme, the touch of berries on the bush, the light glittering on freshly picked apples. This embodied connection with food, I argue, is essential to draw us into caring attention with our food.

The Tech

In a 2019 comedy special, Ronny Chieng quips: "America. The land of the free and land of never-leave-your-house. No item too trivial, no item too small to be hand delivered into your home like an emperor. Same-day delivery? [vomiting motion] We need 'Prime *Now*'…When I press 'buy' put the item in my hand." The audience laughs along, as people likely identify some of their own shopping habits in the comic's routine. The special was filmed before the COVID-19 lockdowns, when online shopping became a necessity for many. Since then, ordering food online has been further ingrained in people's daily or weekly routines.

Both shaping and responding to a culture of convenience, the world's largest retailer, Amazon, announced further investment into delivery robots with a spokesperson claiming: "We will react and we will obsess about what the customer wants and if they want their toothpaste faster, we will help them get their toothpaste faster" (Rushe, 2022). There was not a trace of Cheing's humor in the statement.

The ability to get single items and full grocery hauls delivered to the door within a day or two is made possible through a complex system of technology, humans and the more-than-human world. The person buying the food, however, is less in contact with the other beings and more with technological interfaces. When ordering the weekly groceries, for example, I would scroll through the pages and click certain items. My choices involve a variety of reasons, like my upcoming plans, the prices, cravings, an impromptu desire for something I see. The user-experience design app plays an enormous role in guiding these choices. As I click on apples, for example, recommendations to upgrade the quantity or add in some oranges usually appear somewhere on the screen. These little prompts are designed to subtly nudge me to purchase more.

But unlike the grocery store, market or garden, particular fruits do not call me. I cannot touch the various lemons or hold the tomatoes to my nose. I cannot speak to the farmer and ask how the chickens are doing that lay the eggs for my omelet. Instead, I scroll through stock pictures of produce that are placed just-so under perfect lighting. These are the same photos seen by my neighbour or someone shopping on the other side of the country. None of us, of course, will actually receive the food in the photo. Once my order is complete I click on the metaphorical shopping cart. I pay. Tomorrow or someday soon my groceries arrive at my door. All I have to do is open it and take the box from the hands of a stranger. They smile, usually, trot back into the van and rush to the next customer. We do not mention the food or co-wonder if the weather affected the asparagus. It is an efficient transaction between two people

and rarely anything more. Robot developers and companies hope to replace many of these already impoverished moments of connection with drones in the sky and autonomous or semi-autonomous vehicles on the sidewalks and roads**.**

The continued development of such technologies is motivated, in part, by a desire for ease and convenience. The widespread prioritization of these values, however, does not come about simply because individuals have an instinctual proclivity towards them. It also emerges from a particular political economy that plants fear and scarcity into the hearts of its people. When people work 40 hours a week or more, there is little time left over for life's pleasures and general upkeep. Under the pressure of time, gathering food can seem an appealing necessity to optimize so that there is more time for something else.

The notion that a technology will free up time for more meaningful aspects of life is a common narrative that drives development and public acceptance. It is also one that should always be questioned. In the classic work on women's history and technology, *More Work for Mother*, Ruth Schwartz Cowan shows that the devices sold to free up time for middle-class women, like the washing machine or vacuum, increased expectations for domestic cleanliness leaving women feeling busier than before (Cowan, 1983/2023). Readers will also know that the purported convenience of the smartphone, with its constant access to emails, weather, news, and location, often drains time rather than freeing it up**.** While grocery shopping online is efficient in some ways, when we are not limited by a store's hours or physical distance we can be led down a path of seemingly endless comparing of prices and delivery times.

But the issue of time here is not merely a matter of what tasks will be added or subtracted within a finite amount of time. It is a fundamental issue with a dominant way of inhabiting temporality, which treats time as scarce and the day as something to be optimized. In chasing endless efficiency, the relational textures of life are brushed over. In the *swipe-tap-buy* connection between thumb and screen, the moments of sensorial connection between body and fruit are lost. And while a webpage might include information about land and farmers (which happens rarely), online content is not a replacement for interactive contact.

You might be shifting in your chair at this point, muttering that the lack of connection I point to is already well-established in modern grocery shopping. You are right. Consider how the same produce is readily available no matter the season and the buildings extend far beyond the reach of natural light. Shiny floors and clean potatoes make no reference to the soil; pre-sliced meats in Styrofoam packaging show no resemblance to the animal they once were. Face-to-face connection and chatter

once exchanged at the deli counters or cash register disappear with the influx of pre-packaged sandwiches and self-checkouts. Online shopping and delivery services used by many people today involve new technologies, but carry on well-established patterns of disconnect.

The Offerings of Care Ethics

There are other ways to relate with the lives that help to nourish us. Farmers, activists, indigenous communities, and scholars have long been challenging violent food systems by imagining and living out ways of eating based on care and reciprocity (Carlisle, 2022; Lilia & Peña Azcona, 2020; Shiva, 2016). Within this already vibrant discussion, I offer insights on caring attention and the ethics of care from my training in Western academic philosophy. Before diving into the theory, I want to note that Western academic philosophy tends to place care ethics as an aside in textbooks and ethics courses. It is often presented as a radical and relatively new theory within philosophy. Yet the relational ontology it proposes only seems alternative because it is situated within a philosophical tradition that prioritizes individualism. Indigenous worldviews, non-Western cultures, as well as centuries-old spirituality and religion have long endeavored to care for the relational ties that bind life together. Still, I think that care ethics has insights on caring and attentiveness that prove useful when examining the moral import of grocery technology.

Care ethics emerged in the 1980s with Carol Gilligan's book *In a Different Voice*, which analyzed the moral reasoning of young girls and boys (1993). Contrary to the dominant interpretations in moral psychology at the time, Gilligan argued that girls' tendencies to prioritize emotions and relationships was not inferior or unsophisticated in comparison with the boys' more formulaic and rule-based reasoning, but rather was *another way* of sorting out moral and social life. In writing *In a Different Voice*, Gilligan hoped that the work would offer women "a representation of their thought that enables them to see better its integrity and validity, to recognize the experiences their thinking refracts, and to understand its line of development" (p. 3). Her work helped legitimize the roles of empathy, emotions and relationality in moral reasoning within the world of science, which had long dismissed their importance. And while Gilligan's work focused specifically on two genders— boys/men and girls/women— her work was quickly expanded by moral philosophers, political scientists and psychologists alike as they examined how care for others can and should infuse decision-making, regardless of gender.

Care is not often at the fore of the cultural milieu. There are few blockbusters about household chores or hit songs about repairing traffic lights. Care settles into the background of our perception even though everyone relies on it for daily existence. Further, there is a common notion that care is relegated to the realms of home or hospital, involving sentimentally inclined people serving warm soup to a child or someone who is sick. But, as most care ethicists would argue, care extends well beyond this narrow trope and is everywhere supporting a functioning society (Care Collective, 2020; Held, 2004; Toronto, 1993). Teachers, politicians, managers, and line cooks all contribute to society's network of care (though whether or not they do this well is another story). But beyond these professional roles, we also care when we show up for a colleague's talk to support them, spend our Saturday repainting the outdoor windows in a shared building, support the local cheese shop with weekly orders, and ask the daycare worker how she is feeling because she was sick last week. The list could go on, but I am pointing to a basic truth: care practices run through each of our days.

The sheer extent of care is often overlooked because care has a long history of being associated with the body, emotions, weakness and femininity (Tronto, 1993). Each of these are aspects of humanity that fall short of the modern individualism and self-sufficiency in the patriarchal paradigm. The economic policies and neoliberal ideology that infused many Western societies in the 1980s openly rejected human dependency. While social services lost funding and closed their doors, individuals were told to pull themselves up by their bootstraps.[79] Yet, whether it is government funded or not, care still happens because humans cannot live without it. The market answers the demand for care by supplying private services and/or relying on individuals in a community to care it for free. Paid or unpaid, it is women who take up a disproportionate amount of this labour, particularly women of colour who are often migrants to the Global North (Farris, 2020).

Over decades, care ethicists have shed light on the places where care has been overlooked. As a framework, care ethics has applied to myriad settings, including robotics (Ley, 2023; Van Wynsberghe, 2013), agriculture (Lilia & Peña Azcona, 2020; Preston & Wickson, 2016), business management (Hamington & Sander-Staudt, 2011), healthcare (Lachman, 2012), and social policy (Sevenhuijsen, 2003). Running underneath these wide-ranging applications is a commitment to a particular ontology, namely one that recognizes that being human is fundamentally, inextricably relational

[79] Interestingly, the phrase to "pull yourself up by your bootstraps" originally referred to an absurd or impossible task. Sometime in the 1920s, however, the meaning began to shift towards its current understanding: to better your situation without outside help.

and interdependent. This stands in contrast to dominating approaches in Western philosophy, which tend to take individualism as a starting point for theory. A classic example of this is Thomas Hobbes, a canonical political philosopher from the 17th century, requesting that those reading his political treatise assume that as "if they had just emerged from the earth like mushrooms and grown up without any obligation to each other" (Hobbes, 1642/1988, p. viii). Centuries later, care ethicist Virginia Held quips that Hobbes takes "no notice of persons having been born of mothers and having received a huge amount of care before attaining whatever measure of independence they have" (Held, 2011). I write this at seven-months pregnant with a toddler at home, knowing all-too-well that children neither pop up nor out as ready-made political citizens.

Now, some might argue that just because humans are relationally connected it does not follow that they should be or should endeavor to relate well. In fact, in order to avoid the potential is/ought conflation (a taboo in Western moral philosophy), I was recently asked to make a logical argument linking the descriptive claim— we are always in relationship— to a normative claim like, "we *should* take care of those we are in relationship with" (Umbrello, 2023). After much thought, I have decided not to do this. The notion that the descriptive and normative are separate here and can only be brought together through argumentation is a reflection of how disconnected Western thinking and moral philosophy has become from ethical living. Indigenous cultures around the world have long seen the world in terms of relationality, which they see as inseparable from questions of "how should I be?" or "how should I act?". Yet the entanglement between relationality and ethics is not argued for through the means of logic, but is instead reflected in the way of life and culture.

One such case is described by ecologist and philosopher, David Abram, who describes the reverence with which Indigenous communities in California met the returning salmon each year (2018). Instead of grabbing as many as possible the people honoured the fish through ceremony, bringing a select few first to community elders. Abram writes: *"A key effect of such ceremonies, and of the restrictions on fishing during their enactment, was that significant numbers of early salmon were enabled to pass freely upriver to their spawning grounds, ensuring the continued replenishment of the run." Abram also is sure to mention that a balanced relationship with the salmon, where both human and fish flourish, does not just happen. Tribes overfished and faced famine, but through attentive attunement year in and year out were able to "gradually learn how best to harvest the collective gift without interrupting its cyclical replenishment"* (2018).

To be clear, I am not arguing that the fact of interconnectedness means that all relationships are good or desirable. A quick reflection on personal or political life will

easily show many examples of uncaring relationships. Further, we should not romantize care as sweet and lovely. It is often messy, asymmetrical, and laced with complicated emotions like resentment and frustration. As Alexis Shotwell argues so beautifully in her work, *Against Moral Purity*, we are all morally tainted and trying to avoid this only distracts from living out an ethical life. My claim, then, is that our fundamental relationality is always tied to the question of "how should I relate?" and further specifically, "how should I relate well?" It is from this worldview, where relationality and trying to live out relations well are intertwined, that I examine the latest trends in grocery shopping technology.

Caring Attention: an Alternative to the Attention Economy

Definitions and theoretical formulations within care ethics are varied, but all agree that care involves a response to another's needs, which are discerned through attentiveness. Virginia Held, for example, writes that an "ethics of care focuses on attentiveness to context" (2004) and Nel Noddings claims that "the carer (or the one-caring) is first of all attentive; she or he listens to the cared-for and is especially attentive to the needs expressed" (Noddings, 2008). Tronto articulates the need for attentiveness most clearly, writing in *Moral Boundaries:* "If we are not attentive to the needs of others, then we cannot possibly address those needs. By this standard, the ethics of care would treat ignoring others […] as a form of moral evil" (1993, p. 127). Expanding on Vallor's concerns, I believe that by designing technology to lull people into mindless scrolling for the purposes of gathering and profiting from data, the architects and participants of the so-called attention economy are partly responsible for a moral deskilling of care.

The quality of attention care ethicists talk about stands in contrast to that of the attention economy. The common language around attention is laden with militaristic and economic ideology. We capture, grasp and hold attention. We pay attention and there is a cost to losing it. Media outlets deem data the "new crude oil" waiting to be refined for profit. Attention is the method of extraction. The lens of resource and domination is similarly taken up by public critics of the attention economy, who warn that each of us only have so much attention to give and so we must protect what we have (Williams, 2018). Under this way of thinking, the willpower required to guard against forces trying to steal attention is inspired through fear of losing focus and capacity for deep thinking. Infused in all of this is a narrative of scarcity, which pushes people into the individualistic hoarding typical of capitalist cultures.

Resisting this path requires acknowledging the real militaristic and capitalist forces at work, while also stepping away and taking up attention in a radically different way. Instead of attention as a scarce resource fought over by individuals and corporations, parsed out in tit-for-tat transactions, caring attention is an on-going relational practice irreducible to market-place transactions.[80] I argue that this latter kind of attentiveness is crucial to the building of epistemological, affective, and imaginative aspects of care.

Stepping into a state of attentiveness shifts us from habitual movements and busyness to being in a state of more intentional presence. Tronto draws on the thought of Simone Weil's, a mystic theologian and philosopher, account of attentiveness, which involves "suspending one's own goals, ambitions, plans of life and concerns, in order to recognize and to be attentive to others" (1993, p. 128). Every reader will know this experience, which involves an embodied shift of slowing down and "getting out of your own head". On good mornings, I make this transition by putting aside the mental to-do list, breathing deeply and sitting down for breakfast with my daughter. Instead of strategizing the logistics of the nursery drop-off alone in my mind, I am brought into connection with the one who actually needs my care. Though she does not yet speak words I understand, she has much to say about what she needs to get out the door. She wiggles a sockless foot, bats eyes that yearn for a hug, or screams for water that I always seem to forget on the counter. The epistemological result of my attending to her is two-fold: one, I notice who I'm relationship with, and two, I open myself to recognize needs I might not have considered in my own thinking.

Yet, noticing those we are in relationship with and observing their possible needs is unidirectional and extractive if we stand unaffected on the sidelines. Poet, Mary Oliver, writes of this: "Attention without feeling, I began to learn, is only a report. An openness — an empathy — was necessary if the attention was to matter" (2007). Caring attentiveness involves the openness Oliver describes, as it invites us into a dynamic of on-going and mutual attunement with the other. Vulnerability and humility is unavoidable because we have to acknowledge that we cannot simply act on the world, but are always acted upon, too. The binary of active and passive becomes blurred.

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80 To read more about attention as a practice, in contrast to a resource, read Bombaerts, G., Anderson, J., Dennis, M., Gerola, A., Frank, L., Hannes, T., & Spahn, A. (2023). Attention as practice: Buddhist ethics responses to persuasive technologies. *Global Philosophy*, *33*(2), 25.25.; Dan Nixon, "Attention is not a resource but a way of being alive to the world" (Aeon, 2018); Jenny Odell. (2020). *How to do nothing: Resisting the attention economy*. Melville House, 2020.

This affective quality of caring attention shifts us out of the solely individualist and intellectual approach to the world, inviting us into a relational, embodied and emotional involvement with the life around us. Practicing this quality of attention is important in getting care right because it asks the care-giver to suspend their preconceived notions of what might be needed and attune to the person in need. This humble posture, which admits some degree of not-knowing, creates spaciousness for imaginative and creative thinking. From this place, actions often emerge from sources of knowledge that have been marginalized in the Western philosophic tradition, namely intuition or bodily knowing.

The attention economy dampens our capacity to imagine and to come up with imaginative ways of caring. Black Liberation theorist, artist and activist, Tricia Hersey, aka The Nap Bishop, writes that constant scrolling is the "perfect plan to keep us distracted and addicted" (2022, p. 67) and that "to exist daily over time in a space of increased virtual experiences will have a lasting effect on our ability to push back against capitalism and white supremacy" (p. 70). Daily entrenchment within a digital world designed to keep us scrolling leaves little time for staring out the window, walking in silence, or wandering around a new market. In these restful moments, ones that are not inundated with excess stimulation from a device, the mind can wonder and move creatively. It can also recognize and respond to the spontaneous happenings that the world has to offer. In this relational and creative connectivity with our surroundings, we are better able to discern and respond to the needs of other.

Being Called to Attention

An important aspect of caring attention is not something that can be achieved once and for all. It is an on-going process of attunement with the other(s) we are in caring relation with. Over time and experience a carer will inevitably get into a flow of habitual activity, so that they are not consciously thinking about how to go about their work. I, for example, was a panicked diaper changer when my daughter first arrived, constantly asking others if I was doing it right. Then, within days, I was doing it in the dark with my eyes half shut. Some eighteen months later, however, I find myself stepping back from the change table having to rethink the process that has worked until just last week. My baby has become a little girl with clear ideas about how she would like to be clothed and will use brute force on anyone who attempts another way. My bodily movements came to an unabrupt stop as she clutched her diaper and screamed. She demanded that I see her, that I attune and try her way. These points of disruption, where the habit body cannot continue as before, shake us into active

attention so that we reconnect with the other and discern their needs. Since care is an on-going process with beings and things that change over time, these moments of being called to attention are essential to caring well.

Do these jolts out of habitual flow lead to good care? Not necessarily. In fact, they might lead to frustration and reinvigorated commitment to the same course of action. In the case of my daughter, for example, I might easily be irritated by her newfound opinions and try to strongarm her.[81] What is needed is an underlying commitment or intention to care, so that we take up disruptions as invitations to reorganize our caring actions. This fundamental commitment to caring well does not guide most corporations and technology companies.

Despite tech companies branding themselves as "disruptors", digital technologies are largely designed to avoid the experience of disruption. A smooth intuitive user-experience is strived for and people using the technology have come to expect this. We have all had the feeling of frustration when a website link does not work or, god forbid, the colour wheel begins to spin. In absence of interruption, our thumbs scroll through feeds and click on recommendations, our eyes scan, and we find ourselves forty-five minutes down a celebrity relationship rabbit hole. The design of these platforms is not meant to lull us completely, however. Advertisements are carefully placed in the humdrum of digital life to give us a subtle shake into attention (Williams, 2018). These shake-ups are designed, however, to service profit and not to attend caringly to our relationships.

A critical difference between prompted disruption on the screen and that which we experience with another being is that the former can never be spontaneous. Be it my daughter suddenly clutching her pants or my mother's berry bushes unexpectedly growing three times last year's yield or the local cooperative no longer carrying black beans, my pre-determined ideas are forced to a halt as I am faced with the complexity of the other lives in which I am entangled. I cannot simply do what I want, when I want. This is a moral blessing because it draws me to pause and attune to that with which I am in relationship.

While these moments can feel abrupt, they do not spring up out of nowhere. My daughter is reaching a point in behavioral development and physical strength that brings about her rebellion. The rains, soil health and presence of pollinators all factor

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81 Admittedly, I did try this when late for nursery drop-off. I was met with astonishing strength and commitment on her part. She simply refused to have her needs brushed over. Deciding I was not willing to literally twist her arm, I stood back and waited until she was ready. It did not take very long for us to get back on track.

into crop growth. The supply chain and consumer demands play a role in my black bean dilemma. Still, each of these complex systems and developments is filled with the movements of life, which cannot be predicted for certain nor explained entirely. Accepting this uncertainty is an essential part of a caring relationship. Nothing is settled so we must check-in over and over to see if the way we are caring is actually helpful to those we are trying to care for. The more we offload our food choices to recommendation systems or automated purchases, the more we lose the opportunity to be shaken into caring attention and to step into active attunement with our food.

Grocery applications can be designed to reflect or mimic the unpredicted fluctuations in growing food. An app may prompt you towards the strawberries when they are in seasonal abundance or let you know that while the potato yield was low this year, the squash might be a suitable alternative. There might be a profile on the new farmer who collects your eggs or an explanation why the bean provider switched. None of these confrontations emerge from the movings of complex ecological relationship. Instead, they are carefully designed to engage customers and move products through the supply chain efficiently. Corporate grocery chains develop these prompts in response to sophisticated predictive modelling that corrals customers towards purchases that benefit the company. A grocer prioritizing values other than profit, like sustainability or even care, might also include prompts or disruptions to steer the customer's attention towards the growers and seasonal shifts. Even in these latter cases, each of the disruptions to our attention on an app are brought about through the planning and predicting of human minds. They are purposeful, explainable, and lifeless, and therefore lack the spontaneity and unknowability that thrusts us into dynamic care.

The smooth user experience on screen does not allow us to connect with particular foods with all their unique textures and smells. We are not caught by the unexpected gleam of a squash or halted by an empty banana basket. In a culture of efficiency these interruptions are dubbed an inconvenience, but I argue that they are an invitation to switch into a mode of attentive care, with all its epistemological, affective and imaginative gifts.

Other Ways

Does grocery shopping online always lead to wholly inattentive and uncaring relationships with food? I suppose not. Two biodynamic farmers I know recently launched an online shop where they sell homegrown produce and meat sourced from the community. Offerings are changed each week, according to seasonal availability,

and you pick up the order at the farm. You chat with the workers, learn about the fields and the impact of the weather. In this case, we might say that the online platform even helps facilitate this sense of relationship and community. But, I need not pretend that this connection and exchange of knowledge is the way grocery shopping is trending in general. Ask a few friends how they get their groceries or just walk into a big grocery store and I suspect you will witness bodies moving on auto-pilot rather than in caring attention with their surroundings.

Exchanging food with neighbours and sourcing from small shops may seem like a dream or a joke for the city dweller or person on a tight budget.[82] For over a decade I was a community care worker in a Toronto neighbourhood where most people lived on social assistance.[83] There was only one large box-store to buy groceries in the area and many people I knew preferred to eat at the fast food joints that were closer to their houses. This was only a small food desert and much bigger exist.

The existence of food deserts may prompt arguments in favour of grocery applications and delivery systems. Afterall, would it not be easier for someone without access to food, either because of their location or bodily ability, to order online? Yes. It would be easier. But, applying a technological solution covers over the complexity of the problem in the first place. Why are there food deserts? Why can so few people afford small-scale organic food? Why do people feel they do not have time or knowledge to grow their own food? Why are communities not organizing to bring over groceries to bedridden neighbours? These, and many more, are questions that should be asked and answered when discussing the supposed need of more advanced grocery technology.

A grocery system that acknowledges and cares for the relationality underpinning our nourishment cannot merely adjust a store's shopping application, but will involve a seismic reorganization of how people get their food. This would require systemic shifts at the highest organizational and political levels, but I am also convinced it cannot happen without a change in people's hearts. Such a task seems immense and so there is a tendency to want to ignore it or jump into building a new technology that promises saving. But technology is not a saviour. It will not make us nourish ourselves with greater care for others.

I cannot here provide a singular solution, technical or otherwise, that will result in a more caring food system. But, I might offer some words of calm by Audre Lorde: "Sometimes we drug ourselves with dreams of new ideas. The head will save us. The

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82 In chapter nineteen, "My Ineffcient Grocery Routine", I explore this theme further.

83 More on my time in Parkdale in chapter fifteen, "A Philosophic Interlude: Part One"

brain alone will set us free. But there are no new ideas still waiting in the wings to save us as women, as human. There are only old and forgotten ones, new combinations, extrapolations and recognitions within ourselves—along with the renewed courage to try them out" (1984/2012, p. 27) Indeed, we cannot "go-back" to a romanticized technology-free past nor can we leap forward into a future unladen by the troubles of the present. Instead, there is a need to remember the old through reconnecting with indigenous wisdoms and mixing these learnings with the present moment (Carlisle, 2022; Shiva, 2016).

But for now, reader, start simply. Shift into a state of caring attention next time you are shopping for food. Try to run your thumb along a potato instead of tapping on your phone. Visit a small shop and allow yourself to adapt when it does not offer all the items you need. Meet the eyes of the cashier, perhaps even dare to chat. There are big changes to be made, yes. But there are also many small ones that will draw you into caring relationship. And through these seemingly mundane shifts, a revolution can emerge.

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Figure 7 Inspired by René Magritte's 1929 painting "The Treachery of Images". Created online with Kittl Editor.

22. A Poetic Argument in Three Parts[84]

When I tell people that I research robot-ethics (and some AI-ethics) many want to hear my thoughts on the state of machine intelligence and, specifically, whether I think it rivals that of humans. It is with reluctance that I engage in these conversations because, frankly, I have never found them very interesting. In and out of academia, much energy is spent looking for precise definitions and definite boundaries of intelligence to be used in logical argumentation. This formulaic approach has always felt inhumane to me, which makes it a strange choice to argue for the protection of humans.

Humanity is not tidy. We spill over every box and territorial line set to contain us. Should it not be this very imprecision, spontaneity, and open-endedness we draw around to protect us? Is this not how we slip the grasp of code?

Here, let me make an argument that ChatGPT cannot.

Part One: The Cost

A colleague comes to meet my baby.
An intel gathering mission,
disguised in congratulations.
His first child arrives soon.

His eyes grow wide with wonder,
as she wiggles in his lap.
"We could never afford this!"
He exclaims.

He's what they call a "motion planner".
In simpler terms: an engineer
making robots move.
And those machines?
Oh, god! They're hopeless!
They start when they should stop.

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84 Written (and left unwritten) solely for the thesis. "The Cost" was recited at *For the Love of the World: Philosophy, Art, and Technology Festival* organized by Studium Generale TU Delft on March 23rd 2024.

It's not (just) about the robots

Stop when they should start.
To let them learn twenty-four hours a day,
as my daughter does?
Squirming and stretching always?
Well, the computation cost would be
too much.

But, what of those other costs?
The price of the love that was made
to call her down from the stars.
What I paid to steady my breath
as I eased her earthside safely.
The value of that beloved surrender,
the unshirkable defeat needed
to finally push her through.

And what of those nights I spent
pacing in the dark,
humming, "ommmmmmm"
to calm us both?
Perhaps, then, the robot
is more affordable.

At least there's a number:
10 000, 100 000, 100 000 x 2.
My daughter?
She cost me everything
and still more.
I am irrevocably changed
and I call upon the powers of motherhood
to weave a barrier of protection around her
so that she may wiggle at will,
twenty-four hours a day.

He's right.
No one could afford this.

Part Two: Teaching Attunement

There are a few ways to learn about picking tomatoes.
One is naked in your parents' garden,
where you start reckless,
ripping the green ones and not understanding
the possibilities destroyed.
For you know not of the red that was to come.
Remorse is as unknown to you as a ripe tomato.

Then the season passes.
Bitter turns to sweet and, ah-ha!
You begin to know the feeling of a tomato ready to let go.
The slight give at the end of a twist
whispering, "*it's time*", in a voice discernible
only to hands capable and willing to attune.

Now you taste what ripeness is.
Soon you will find that heaven is nearby in the basil pot.
Instinctually, you will jolt your head forward
as juice bursts then drips down your chin.

There is another way taught across town.
The learners are machines, built solely for picking.
No pulse beats down their ancestral lines.
Generational knowledge is the code before.

Their teachers, the humans,
huddle around observing their own hands.
They try to translate touch into numbers.
But our primoradial sense is not easily wrangled.

They bash their heads in frustration,
make compromises they do not want to make.
Connection is reduced to the mere act of grasping.
Success is: whatever works.

It's not (just) about the robots

The robots will never know that pleasure
lies in the waiting and watchful anticipation
of reddening red.
The "*now*!" spoken in unison between hand and tomato,
possible each year for but a moment,
made precious by its finitude.

And what of the tomatoes?
Some are coddled with fingers full of gratitude.
Others are modified so they do not break,
when shoved into a box and dropped.

Those first ones ripen proudly under the gaze of appreciation,
as we all do.
Those others do what they're told in the conditions they were given.
They are one of millions, not one in a million.

Do they dream for more, those tomatoes under bright lights?
Do they yearn to bask in the sun?

Part Three:

This poem is flitting above my head, but not ready yet to come down. I don't dare try to grab it.

23. What's a Philosopher Good for?[85]

Existential worry hits me every so often and propels me to ask (excuse my language): what the hell am I doing as a philosopher?(!) During one of these fretful episodes, grace divined that I was at a week-long gathering on neuroscience, philosophy, and contemplation practice. I ran up to the kind neuroscientist who'd given a keynote that morning, hoping his scientist way of thinking could straighten me out. With pleading eyes, I asked: "What do you think philosophers are good for?"

He calmly replied that if he had enough funding (always the trouble, isn't it?), he'd hire a philosopher on every project. They would be given a highlighter and asked to mark up all the assumptions, conflated meanings, or unexplained terms in the team's grant proposals and papers. He knew that in a Western philosophy education you learn to spot the holes in an argument, or perhaps he'd been around a philosopher at a dinner party insistently asking: "What do you *mean* by that?"

Until only recently I had assumed that the purpose of discerning lapses in a claim, argument, or theory, was so that they could be rectified by connecting the dots more thoroughly. The end goal is an airtight argument. But I wonder now if another role of the philosopher is to find those gaps and open them right up so there's no end in sight. Paradox and imprecision wouldn't be tidied up but would be seen as invitations to explore the inevitable noded textures of life. In the spirit of juxtaposition, there would be an integration of expansive and narrow thinking, multitudes and particularity.

This thesis has started towards this kind of integration. It's clunky, still, and includes bricks as well as threads.[86]

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85 Written solely for this thesis.

86 More on the rubble in the chapter two, with links to Vanessa Andreotti and Elwood Jimmy's work: ""Towards Braiding #1: bricks and threads" *Gesturing Towards Decolonial Futures* https://decolonialfutures.net/portfolio/towards-braiding-1-bricks-and-threads/?utm_source=substack&utm_medium=email

24. A Wide and Narrow Ending[87]

We are near the end now and so it is time, I think, to take you to back to the beginning. As I interviewed for this doctoral project, my future promoter, Sabine Roeser asked: "Will you find this project on retail interesting? It's a big shift from working on medical care." I replied, "Anywhere where there are humans is interesting to me."

We are fascinating creatures, are we not? Made up of whirling entanglements, even our sterile spaces are only supposedly so. Everywhere we are there is a dance of emotions, hopes, dreams, and remembrances. There are gestures that span tiny to grand; little grievances and big smoldering wounds. It is not in our nature to be straight or narrow.

As I wrote in chapter twenty-two, a retail system driven by profit and efficiency is a fruiting body that emerges from a network of capitalism, patriarchy, whiteness, and colonialism.

This thesis, I hope, has attended to the particularities of the mushroom as well as the mycorrhizal network. Robots in retail invite specific questions about worker wellbeing, sustainability and design of materials, economic stability, and organizational restructuring. There are new technical capabilities in used robotics, like motion sensors and voice simulation, that demand inquiry into specific areas like privacy and social manipulation. Certainly, the increasingly dynamic movement of robots necessitates attention towards how people feel around robots and how humans relationships with each other and the more-than-human are affected by this change.[88]

But as my engineering colleagues have pointed out over the last years, many of these are not specifically problems with robots, but problems with automation in general. I agree, but go a step further to say that retail robots and automation stem from an underlying rot in the Western worldview. Deep in the roots is a belief in the illusion of separateness. A sense that the world is split up into parts and that some parts are more important than others. In this mechanistic perspective, force is the

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87 Most of this conclusion was written solely for this thesis, however some sentences have been scoured from an article I wrote for Yes! Magazine, "Overcoming Colonial Thinking to Connect with Life" (2022, December 12) and from my publicly accessible substack blog, *Beauty in the Mire* (all written during my doctoral contract).

88 These specific ethical questions are raised in chapter seven, "Ethical Aspects of Human-Robot Collaborations in Industrial Settings", chapter eight, "Ethics of Retail Robots: Mapping the Field", chapter ten, "Care Ethics and the Future of Work: a Different Voice", and chapter twelve, "Empirical Investigations: Systems Thinking in Robotic Workplaces".

motivator of action and the intellect is primary source of knowledge. This way of thinking is ingrained in people's perception such that they do not *feel* their ecological nature and fundamental kinship with life itself.

My tendency to jump around from narrow to far-reaching vantage points can be dizzying.[89] I have found momentary clarity in the term "metacrisis", however. This year of 2024 is a time seemingly exploding with crises— climate crisis, food crisis, loneliness crisis, political crisis. Our urgent minds cling to one then another, often leaving us immobilized by overwhelm. The concept of *metacrisis* articulates a shared root cause, namely a permeating sense of separateness and a disconnect with the spiritual world.[90] As with any bold term, there is a buzzing debate around the definition of metacrisis. I am not interested in that here. Instead, I am hearkening back to feeling of relief and assurance I felt when hearing others talk about my culture's spiritual impoverishment. For a long time my intuition had been telling me that this needs to be addressed in discussions on technology ethics.

As a researcher and teacher at a technical university, I often hear big ideas about how to solve the world's crises and build a brighter future. Alongside my own project's vision to have retail robotics to reduce food waste, I hear of efforts towards global emissions management, grand geoengineering endeavors, and space travel. Many of these projects are innovative—feats of the intellect, really—but as I hear them, the absence of life and reverence for it looms loud. The graphs and catchy pitches leave little room for the *beings* these projects purportedly aim to protect.

The pull of trying to solve problems is nearly irresistible, especially in times like these when many feel desperate for change. Amidst the overwhelm, poetic philosopher Báyò Akómolafé offers *postactivism* through his invitational words: "The times are urgent, let us slow down."[91] Be careful here— he is not proposing slowing down as a way to solve problems more effectively. Postactivism does not follow the mathematics of: more rest = more productivity. His words carry on a rebellious lineage of those pointing out the impossibility of change if we continue the same patterns, behaviours, and perspectives are continued. Or, in Audre Lorde's words,

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89 Remember the post-it note on page 4?

90 For a thorough introduction to the *metacrisis*, I suggest reading Jonathan Rowson's 2021 essay "Tasting the Pickle: Ten flavours of meta-crisis and the appetite for a new civilization" published by Perspectiva Press. There is also a wonderful podcast, Entangled World, where najia shaukat lupson interviews a range of experts on the metacrisis.

91 You can read more of Akómolafé's work here: https://www.bayoakomolafe.net. But I also encourage you to listen to him on Youtube or in podcasts. He speaks in a poetic spirit that evokes and invokes, or "infects", as he would say.

"The master's tools will never dismantle the master's house."[92] Postactivism troubles the promise that technology will lead to salvation. It raises a brow at the narrative that robots and artificial intelligence will free up time, money, and resources. It gives a knowing smile upon hearing that optimization through automation will help save the planet from climate disaster.

Do you not feel the outward force of these plans? Can you not taste the colonialism infused in the words? Do you not see the whiteness that wants to obliterate and make clean? The promise of "saving" or "fixing" is one of the many ways the modernity worldview denies our relationality. As I have already referenced,[93] Alexis Shotwell calls us to accept our inevitable complicity instead of trying to flee it. The impulse to be morally pure is not purely theoretical, either. It changes how we move. Once I once found myself grasping for moral purity when walking in a meadow. I had been swaying with a colourful collection of petaled bodies, smiling with them towards the sun. But soon I froze with my foot hovering at the edge of a down step. I was seized by the thought that every movement I took destroyed the life beneath me. No matter how light I endeavor to be the nature of my embodied self means that I *have* to step, lay, or sit. Something akin to survivor's guilt began to bubble in my gut as I tried to lightly hurry off the grass. Seeking refuge on the sidewalk, I see now, is telling of what I deem worthy of protection. Is the concrete not alive, too?

The aliveness of the sidewalk and possibilities of animism will be explored more in my next research, but stretches us too far at the moment. Let us stay, instead, focused on my impulse to run away from the death of the grass. In perfectly predictable paradox, this instinctual denial of destruction is mirrored in my unconscious denial of life. When I moved into a new apartment in Delft, I walked out to the garden, looked around, saw what might be changed to fit my aesthetic, and went back inside. I did not greet, or even acknowledge, all the beings already living there.

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92 Lorde, A. (2012). *Sister outsider: Essays and speeches*. Crossing Press.

93 Though brief, there is more on Shotwell's work found in chapter twenty-one, "Caring About Food: Attending to Your Swipe-Click-Buy Habit", page 130.

Through the decolonial and animistic teachings by Vanessa Andreotti, David Abram, Tyson Yunkaporta, Kim Tallbear, and Báyó Akómolafé,[94] I am slowly uncovering how my inhalations within the colonial atmosphere of my upbringing shape my actions. My very perception is skewed towards solutions, extraction, and control. I know full well that overcoming this problematic mindset cannot be tackled with my usual slew of deadlines and measurable goals, since these are part of the problem. Instead, it must be a great easing. A gentle breathing that loosens the immobilizing shame I bear for my colonial mindset and soothes the adrenaline spikes that propel me into anxiety-fueled action.

Still, my perception may never be wholly liberated from my ancestral thinking. When saying a belated greeting to my backyard this past summer, I stopped in front of each plant separately: the eight shrubs, two trees, many ferns and flowers, grapes, berries, and two pigeons. This parsing up of the land is an impulse of the individualist worldview that gave rise to private property and ownership. And it is in the same vein as the impulse to encounter and assess each plant based on its potential utility to me. When meeting the red raspberry bush, I imagined the berries I could eat. When stung by nettles in the park, I thought of how to pilfer them to make tea. In doing so, I miss the opportunity to say "hello," a simple yet profound greeting that lays the relational groundwork for the future question, "May I?"

My deeply held tendencies toward individualism, extraction, and separation will not be easily shifted. But with tender attention, they might be eased over time. As I experiment with this embodied practice of recognition and relationship, I already feel a difference in how I move in the world. The uniqueness of this place unfolds, and grand global fixes seem more and more out of touch. This is not to say that massive shifts in politics and the economy are not needed. But rather that these shifts should begin from a place of communion rather than generalization.

Oh dear. This dissertation was supposed to be about retail robots, was it not? These last pages have dabbled in expansive thinking. For the fun of juxtaposition, then, let me end narrowed in and with utter clarity. In the thick of this current paradigm, I do not think there should be any more energy or resources put into the

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94 Some starting points: De Oliveira Andreotti, Vanessa. (2021*). Hospicing Modernity: Facing Humanity's Wrongs and Implications for Social Activism.* Berkeley: North Atlantic Books; Abram, David (1996). *The Spell of the Sensuous: Perception and Language in a More-than-Human World*. New York: Pantheon Books; Yunkaporta, T. (2019). *Sand talk: How Indigenous thinking can save the world*. Text Publishing; TallBear, K. (2011). Why interspecies thinking needs indigenous standpoints. *Cultural Anthropology*, *24*(1), 1-8; Akomolafe, B. (2017). *These Wilds Beyond Our Fences: Letters to My Daughter on Humanity's Search for Home*. North Atlantic Books.

development of retail robots. The machines perpetuate a legacy of carelessness by distancing people further from the lives involved in getting food to their table and goods to their houses. In order for robots to complete tasks, people, food, and places will be further straightened and standardized. The tyranny of efficiency wipes out beauty, spontaneity, and pleasure. This, I believe, is not a life worth striving towards.

25. Getting Out of the House[95]

They say that I live in a time between worlds, a liminal space, a cosmic paradigm shift, a shoe about to drop, a final contraction before the big push.

I don't know about all that. But I do know that I have trouble getting out of the house. My toddler wants to put her socks on herself and, frankly, she's bad at it. "There's no rush, sweetheart" I say in a loving tone, while my eyes dart with panic at the baby getting hot in his snowsuit. The dog manages to always be underfoot, moaning in anticipation of our separation. My feet are angled towards the door, nearly tapping with irritation. My calm façade is fragile and cracking.

Once outside I run back in for various necessities—snacks, water, wallet, a stuffed animal. The children strapped into the bicycle hear me say, "Almost! Just need one more thing. Nearly there." My daughter eventually cries, "Mommy!" If the neighbours are watching, they see me curse under my breath.

This is a metaphor of the times we're in, isn't it? We're trying to get out of the house of industrial capitalism, of patriarchy, of colonialism and modernity.[96] But our clear plans and calculated strategies splinter under pressure. Panic bubbles near the surface and threatens to burst through. We run back to grab things we think we need. Our children are swept up in our bustling, pleading us to take a deep breath and gather ourselves.

The chaotic swirl of me getting out of the house isn't just a metaphor for the times we're in. It's also an example. I'm thinking of magical fractals, which are a natural phenomenon where patterns repeat across scales. A tree is a great example— if you look, you'll notice that the y-shaped pattern of branches breaking from the trunk is repeated by the smaller branches and even the veins in the leaves.

We humans are full of fractals. When trying to understand the big problems of today—climate change, political polarization, the loneliness epidemic, to name a few— much of what you need to know is found in the mundane day-to-day. I'm talking the real normal stuff, like how people wake up in the morning, chew their food, and get out of the house. Just look to my tense shoulders and desire to be on schedule for all the answers you need.

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95 Written solely for this thesis and shared on my substack blog, *Beauty in the Mire.*

96 The House of Modernity is a "creative social map" included in *Hospicing Modernity* as a "tool to start conversations about violence and unsustainability of our current system" (pg 106). It is well worth looking into because, as usual, Andreotti's analogy helps make sense within the overwhelm.

But, you know? I think global change is afoot. I think so because I'm changing. This morning I moved slowly without panic. When my shoulders rose up, I soothed them down with deep breaths. I read the same book three times in a row with my girl curled on my lap. I didn't rush her when she put her boots on and, miraculously, they ended up on the right feet. Her baby brother didn't cry.

Can the world's problems be changed just by my breath? I don't know about all that. But I do know that I got out of the house this morning and my children were smiling.

The Simon Stevin Series in Ethics of Technology is an initiative of the 4TU Centre for Ethics and Technology. 4TU.Ethics is a collaboration between Delft University of Technology, Eindhoven University of Technology, University of Twente, and Wageningen University & Research. Contact: info@ethicsandtechnology.eu

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Simon Stevin (1548-1620)

'Wonder en is gheen Wonder'

This series in the philosophy and ethics of technology is named after the Dutch / Flemish natural philosopher, scientist and engineer Simon Stevin. He was an extraordinary versatile person. He published, among other things, on arithmetic, accounting, geometry, mechanics, hydrostatics, astronomy, theory of measurement, civil engineering, the theory of music, and civil citizenship. He wrote the very first treatise on logic in Dutch, which he considered to be a superior language for scientific purposes. The relation between theory and practice is a main topic in his work. In addition to his theoretical publications, he held a large number of patents, and was actively involved as an engineer in the building of windmills, harbours, and fortifications for the Dutch prince Maurits. He is famous for having constructed large sailing carriages.

Little is known about his personal life. He was probably born in 1548 in Bruges (Flanders) and went to Leiden in 1581, where he took up his studies at the university two years later. His work was published between 1581 and 1617. He was an early defender of the Copernican worldview, which did not make him popular in religious circles. He died in 1620, but the exact date and the place of his burial are unknown. Philosophically he was a pragmatic rationalist for whom every phenomenon, however mysterious, ultimately had a scientific explanation. Hence his dictum 'Wonder is no Wonder'